

## **CARIBOU MANAGEMENT REPORT**

From: 1 July 2002

To: 30 June 2004

### **LOCATION**

**GAME MANAGEMENT UNIT:** 25A, 25B, 25D, and 26C (59,400 mi<sup>2</sup>)

**HERD:** Porcupine

**GEOGRAPHIC DESCRIPTION:** Eastern portions of the Arctic Slope, Brooks Range, and northeastern Interior Alaska

### **BACKGROUND**

The Porcupine caribou herd (PCH) migrates between Alaska and Yukon and Northwest Territories in Canada. Most of the herd's 130,000-mi<sup>2</sup> range is remote, roadless wilderness. The PCH typically calves on the coastal plain of the Arctic National Wildlife Refuge (ANWR), which is also the most promising onshore petroleum prospect in the United States (Clough et al. 1987). Both industry and government have an interest in developing potential oil resources on the coastal plain. Therefore, various state and federal agencies and their Canadian counterparts are cooperating to carry out baseline ecological studies of the PCH. These studies are expected to provide the basis for mitigation of any adverse effects of petroleum development on caribou.

In 1987 the United States and Canada established the International Porcupine Caribou Board to coordinate management and research among government and user groups. The board includes a representative from the Alaska Department of Fish and Game (ADF&G), representatives of the governments of the United States, Canada, Yukon and Northwest Territories, and members of communities and Native organizations from Alaska and Canada. A variety of factors affect PCH management, including board recommendations, biological studies, and congressional actions regarding the potential opening of ANWR to petroleum development.

The PCH remained more stable than other Alaskan herds during the 1960s and 1970s at about 100,000 caribou (Table 1). In 1979 the population began a steady increase and reached 178,000 caribou by 1989. Annual rates of growth averaged about 5% from 1979 to 1989. The PCH then decreased to 160,000 caribou in 1992, probably in response to lower yearling recruitment after harsh winters. The herd continued to decline to an estimated 129,000 animals in 1998 and 123,000 in 2001, probably due to increased adult mortality (Arthur et al. 2003).

## **MANAGEMENT DIRECTION**

Prior to the early 1970s, the PCH was a low priority for management and research because of its remote location and the small number of people who harvested PCH caribou. However, increasing pressure for oil development in northeast Alaska and growing international interest in the herd resulted in a higher management priority and heightened attention from biologists (Garner and Reynolds 1986; Griffith et al. 2002).

### **MANAGEMENT GOALS**

The following goals, proposed by the International Porcupine Caribou Board (International Porcupine Caribou Board 1998:Appendix 1), were used to guide management activities during recent years.

- Conserve the PCH and its habitat through international cooperation and coordination so the risk of irreversible damage or long-term adverse effects as a result of the use of caribou or their habitat is minimized.
- Ensure opportunities for customary and traditional uses of the PCH.
- Enable users of the PCH to participate in international efforts to conserve the PCH and its habitat.
- Encourage cooperation and communication among governments, users of the PCH, and others to achieve these objectives.

### **MANAGEMENT OBJECTIVE**

- Maintain a minimum population of 135,000 caribou.
  - Conduct censuses every 2–3 years.
  - Estimate parturition rates and late June calf:cow ratios of radiocollared females.
  - Monitor herd movements by periodically relocating radiocollared caribou.
  - Monitor the harvest through field observations, hunter reports, and contact with residents.

## **METHODS**

Personnel from ADF&G, ANWR, and Yukon Department of Environment (YDOE) cooperate to estimate population size with aerial photocensuses conducted at intervals of 2–3 years, using methods described in previous reports (Davis et al. 1979; Valkenburg et al. 1985; Whitten 1993a). The most recent census was conducted on 3 July 2001. At that time the PCH was loosely aggregated on the Arctic coastal plain between the Kongakut and Jago Rivers, with most of the herd located near the Aichilik River. Movements, productivity, mortality, and seasonal distribution of the herd were also monitored, primarily through periodic relocation of radiocollared caribou (Fancy and Whitten 1991; Whitten 1993b, 1995a). Calf

production and survival were assessed by monitoring radiocollared cows in June (Whitten et al. 1992). In addition, personnel from YDOE conducted composition counts on the PCH winter range in March of each year.

Harvest tickets submitted by nonlocal hunters (nonresidents and Alaskans residing outside Units 25, 26B and 26C) provided most harvest data for the PCH in Alaska. ADF&G Division of Subsistence gathered additional data on harvest by local hunters through field interviews. Canadian harvest and composition data were obtained from YDOE. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY02 = 1 Jul 2002 through 30 Jun 2003).

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

#### *Population Size*

Personnel from ADF&G, U.S. Fish and Wildlife Service (FWS), YDOE, and Canadian Wildlife Service counted 123,052 caribou in aerial photographs taken on 3 July 2001 (Table 1). During the most recent previous survey in July 1998, we estimated the herd at 129,000 caribou. The highest population ever recorded was 178,000 in 1989. These results indicate the herd declined by 3–4% per year from 1989 to 1998 and 1.5% per year from 1998 to 2001. Although these censuses may have slightly underestimated the population, all censuses used similar methods and it is unlikely that census errors account for the decline that has occurred since 1989.

A photocensus was planned for summer 2003. However, despite warm weather in June 2003, insect activity was very low. As a result, the PCH did not form the large aggregations necessary for the census, and the survey was postponed. On 23 June 2004, the PCH seemed to be forming the aggregations needed for a census. However, beginning on 24 June, fog covered most of the coastal plain south to the Brooks Range, where it met with smoke from Interior wildfires. The PCH then dispersed south and east into the mountains, and the census could not be conducted.

#### *Population Composition*

We have not estimated composition of postcalving groups since 1992, and the last fall composition count was done in 1980 (Table 2). The survey of radiocollared cows in late June 2003 found 69 calves:100 cows (Table 3). This ratio was not estimated in 2004 because of dense smoke from extensive wildfires that precluded survey flights in late June. March composition surveys by the YDOE found 38 and 33 calves:100 cows, respectively, for the 2002 and 2003 cohorts (Table 3; D. Cooley, Yukon Department of Environment, Yukon Territory, personal communication). Composition surveys from different months are not directly comparable. The June survey included only mature, radiocollared cows, which were not representative of the entire herd. Although the March surveys were not limited to radiocollared caribou, only a small portion of the herd was classified.

### *Reproduction and Calf Survival*

In spring 2003, snow had largely disappeared from most of the PCH migration route by late May, and many parturient caribou had reached the coastal plain of northern Yukon by 27 May. However, much of the Alaskan coastal plain remained covered by large patches of snow on 1 June, and most calving activity occurred in relatively snow-free areas along the southern edge of the coastal plain and in neighboring uplands. Calving began around 27 May (a radiocollared cow was observed with a calf during the initial reconnaissance flight on this date) and probably peaked around 1 June.

During 1–4 June 2003, most collared caribou cows were located along the coastal plain, extending from near the Hulahula River eastward across the Canadian border to the Babbage River. The largest concentration of caribou was in the uplands between the Jago and Kongakut Rivers. Seventy-nine radiocollared cows were observed in early June, including 9 yearling caribou collared in March 2003. Of the 70 radiocollared adult cows, 61 (87%) were judged to be parturient (pregnant or had given birth). Forty caribou were observed with calves, 21 were judged to be pregnant or to have produced and lost a calf (based on presence of hard antlers and enlarged udders), and 9 were judged not parturient (no hard antlers and udders not distended). During the peak calving period in early June, 92% of the radiocollared parturient cows were inside the Arctic National Wildlife Refuge (ANWR), and 36% of these were in the area of the coastal plain under consideration for petroleum development (“1002 area”).

Sixty-seven radiocollared adult cows were observed during the postcalving survey on 24–25 June 2003. Most of the caribou had moved eastward and many were in the northern foothills of the British Mountains of northern Yukon. Two caribou judged to be parturient and one judged nonparturient in early June were not located in late June. Thirty-four (85%) of 40 calves observed in early June survived until late June. Including 12 calves born between 4–24 June, 46 adult cows (69%) were accompanied by calves in late June. Parturition rate and postcalving survival of calves were identical to rates from 2002, but late June calf:cow ratio increased and was the largest since 1999 (Table 3). This suggests that perinatal mortality was less in 2003 than in 2002.

Similarly, by late May 2004, snow had largely disappeared from most of the PCH migration route. However, the coastal plain in northeastern Alaska between the Aichilik River and the Canadian border was snow-covered on 1 June, and this evidently prevented most of the herd from entering Alaska at that time. Consequently, most calving occurred in relatively snow-free areas of the coastal plain and northern foothills east of the Canadian border. Some caribou that wintered in Alaska migrated north through the Brooks Range along the Kongakut River, and these caribou calved along the southern edge of the coastal plain in the uplands near the Jago River. Calving probably peaked around 3–4 June. Seventy-four radiocollared adult cows were observed in early June 2004, as well as two 2-year-old and 1 yearling caribou. Sixty-one adult cows (82%) were judged to be parturient, but all 3 younger cows were barren. Forty-six caribou were observed with calves, 15 were judged to be pregnant or to have produced and lost a calf, and 13 were judged nonparturient. During the peak calving period, 41% of the parturient cows were in ANWR and 25% were in the 1002 area. All collared cows that were within the 1002 area and 93% of cows in Alaska in early June were

parturient, whereas parturition rate for adult cows still in Yukon was 78%. On 23 June, 83 radiocollared cows and 8 collared bulls were located. Most of the caribou had moved into northeastern Alaska and had aggregated in large groups that prevented us from determining which cows were accompanied by calves. Judging by movements of 14 caribou equipped with satellite collars, most of the Porcupine herd subsequently moved southward into the Brooks Range and then eastward into northern Yukon during late June and early July. Few caribou from the PCH remained in Alaska after early July.

### *Distribution and Movements*

Information on movements and distribution of the PCH has been summarized by Garner and Reynolds (1986), Whitten (1987, 1993*b*, 1995*b*), Whitten and Regelin (1988), Fancy et al. (1989), Golden (1989, 1990), Whitten and Fancy (1991), and Griffith et al. (2002).

During summer 2002 and 2003, the PCH began moving off the calving grounds in northeastern Alaska approximately 25 June, and most of the herd had moved eastward along the coastal plain into northern Yukon by 1 July. From there, the herd split apart and caribou moved south into the British Mountains or east into the Richardson Mountains. In 2002 most of the herd remained in Canada in late summer, fall, and winter. However, in 2003 approximately half the herd moved westward into Alaska in September and October and wintered in the vicinity of Arctic Village.

During winter 2002–2003, most of the PCH wintered in the Ogilve and Hart River basins and nearby mountains northeast of Dawson, Yukon. Snow cover in this area was moderate or light (Yukon Department of Environment, unpublished data). Caribou began moving toward the calving grounds in early May. Caribou migrated generally northward to the British Mountains, then followed the Babbage River north to the edge of the Arctic coastal plain, then moved westward into Alaska.

During winter 2003–2004, the PCH was split into 2 large groups, one of which wintered in the Ogilve and Hart River basins and nearby mountains northeast of Dawson, Yukon, while the other wintered in the vicinity of Arctic Village, Alaska. Snow cover in the Yukon area was moderately deep (YDOE, unpublished data), whereas in Alaska there was relatively little snow and many areas were windblown. Caribou from both areas began moving toward the calving grounds in early May. Most caribou migrated generally north or northeast to the British Mountains, then followed the Babbage River north to the edge of the Arctic coastal plain, then moved west toward Alaska.

## **MORTALITY**

### *Harvest*

Season and Bag Limit. The state of Alaska hunting season for all hunters during RY02–RY03 was 1 July to 30 April; in addition, hunters could take only bull caribou during 23–30 June in Unit 26C. The bag limit for nonresidents was 5 caribou. The bag limit for all Alaska residents was 10 caribou.

Alaska Board of Game Actions and Emergency Orders. The Alaska Board of Game took no regulatory action regarding the PCH during RY02–RY03.

Hunter Harvest. We do not have an estimated total harvest for the PCH because harvest data from northern Yukon were not available for RY99–RY04. Harvest by local and nonlocal residents in Alaska was reported differently. Nonlocal hunters used statewide caribou harvest ticket report cards. This harvest was 76 in RY02 and 94 in RY03 (Table 4). Most harvest by nonlocal hunters occurred in Unit 25A (Table 5). Most nonlocal hunters were Alaska residents, and the majority of the caribou they harvested were bulls.

Reporting of harvest by hunters living north of the Yukon River was not required after 1989. Prior to 1989, most local residents did not report, even though it was required. Therefore, local harvest was estimated based on knowledge of local hunting patterns and the availability of caribou near communities. Local harvest depends largely on the relative availability of caribou. Caribou were available to Kaktovik residents primarily in early summer during this report period. Caribou were briefly available to most villages south of the Brooks Range during late summer and fall. In winter 2003–2004, approximately half of the PCH wintered near Arctic Village, where they were easily accessible to local hunters. Consequently, the unreported harvest likely was higher than in most other years. Estimated harvests by local residents in Alaska were 300 and 500 caribou during RY02 and RY03, respectively.

Harvest in Canada probably continued to be relatively high because caribou often move through the Old Crow area several times each year. During fall and winter of RY02 and RY03, many caribou traveled south along the Dempster Highway, where they were accessible to residents of Aklavik, Fort McPherson, and other road-connected communities.

Hunter Success. Nonlocal hunter effort and success varied among game management units depending on herd distribution; however, in general, success rates were high ( $\geq 49\%$ ; Table 5). Word travels quickly when PCH caribou are scarce in Alaska, and few hunters travel to the PCH range. Because of their wide-ranging movements and the difficulty and expense of traveling to the area, the PCH has never been subject to a substantial harvest by nonlocal hunters.

In Alaska, local hunter success during this report period was generally low. Caribou left the Kaktovik area in both 2002 and 2003 soon after sea ice receded in late June, so there was little time during which local residents were able to travel to traditional hunting areas by boat. Caribou were available near Arctic Village for only a few weeks in late summer 2002, but approximately half the herd wintered in this area in RY03. Hunters from other Gwich'in communities took small numbers of caribou along the Porcupine River near the Alaska–Yukon border in fall.

Harvest Chronology. Nearly all nonlocal harvest of the PCH in Alaska occurs during August and early September. Caribou were available in winter 2003–2004 near Arctic Village in Unit 25A, but there was little or no harvest by nonlocal hunters at that time. Local harvest chronology depends on availability of caribou near villages, and harvest occurs whenever caribou are present. However, caribou may be present but inaccessible at Kaktovik in June because traveling conditions are poor.

Transport Methods. Traditionally, nonlocal hunters fly into the PCH range, and a few travel by boat up the Porcupine River. Local residents use boats or ATVs in summer and snowmachines in winter.

## **HABITAT**

### *Assessment*

Population density of the PCH reached approximately 1.0 caribou/mi<sup>2</sup> (0.4/km<sup>2</sup>) in the late 1980s. Studies on the calving ground indicate calving caribou select areas with rapid plant growth, rather than specific sites or habitats. Areas with the most rapid plant growth vary each year, but rapid growth tends to occur most frequently in the region identified by previous research as the primary calving area of the PCH (Fancy and Whitten 1991). This study indicates that, over time, all of the traditional calving area is important for caribou. Preserving or protecting only portions of the calving area may not adequately protect the herd.

### *Enhancement*

No habitat enhancement programs are underway or planned on the PCH's range. Much of the herd's range within Alaska is designated wilderness, and the northern portion of Yukon, Canada is a national park. Most of the area is classified as "limited" for fire suppression, and a natural fire cycle generally prevails.

## **CONCLUSIONS AND RECOMMENDATIONS**

Although the actual population was likely higher than estimated, the 1998 and 2001 population estimates probably did not meet our management objective of 135,000 animals. However, the herd is probably still above levels observed in the 1970s when it numbered 102,000–110,000.

The most likely cause of the initial decline in numbers following the 1989 census was reduced calf production or survival during 1991–1993 due to adverse weather, as reflected in low March calf:cow ratios. Calf production (measured as a proportion of adult cows) from 1994 through 1999 was good, declined dramatically in 2000 and 2001, then increased in 2002 and 2003 (Table 3). Population modeling indicates the decline should have ended by 1998, as relatively large cohorts became adults. The continuing population decline indicates that adult survival may also have declined during the 1990s, perhaps due to increased predation or harvest (Arthur et al. 2003). Although no change in management strategy is needed at this time, the population should be monitored closely during the next 2–3 years. A continuing decline could make it necessary to reduce harvest of females.

The PCH was lightly hunted in Alaska, and harvest probably played a relatively small role in recent population changes. However, existing harvest levels will have a greater influence on population dynamics if the herd continues to decline. The generally high productivity, survival, and good physiological condition of caribou in the herd probably reflect adequate forage quality and quantity, as well as generally mild climatic conditions. If mild weather continues, the herd may increase.

ADF&G is cooperating with U.S. Geological Survey/Biological Resources Division, FWS, and Canadian government agencies to assess the importance of the ANWR coastal plain to the PCH. ADF&G previously identified a portion of the ANWR coastal plain between the Hulahula and Aichilik Rivers as especially important to calving and postcalving caribou and recommended this area for special consideration in any plans to develop ANWR. However, more recent studies indicate all of the ANWR coastal plain and adjacent areas in Canada may be important to the herd over the long term (Fancy and Whitten 1991; Griffith et al. 2002). ADF&G should continue to work with other agencies to identify factors affecting population dynamics of the PCH and evaluate potential effects of development on the coastal plain.

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**PREPARED BY:**

Robert O. Stephenson  
Wildlife Biologist III

**SUBMITTED BY:**

Doreen I. Parker McNeill  
Assistant Management Coordinator

**REVIEWED BY:**

Mark A. Keech  
Wildlife Biologist III

Laura A. McCarthy  
Publications Technician II

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TABLE 1 Porcupine caribou herd population estimates, 1961–2004

Year	Population estimate <sup>a</sup>	Type of estimate
1961	110,000	Calving ground census <sup>b</sup>
1972	99,959	APDCE <sup>c</sup>
1977	105,000	APDCE
1979	105,683	Modified APDCE
1982	125,174	Radiocensus <sup>d</sup>
1983	135,284	Radiocensus
1987	165,000	Radiocensus
1989	178,000	Radiocensus
1992	160,000	Radiocensus
1994	152,000	Radiocensus
1998	129,000	Radiocensus
2001	123,000	Radiocensus
2002–2004 <sup>e</sup>		

<sup>a</sup> All estimates include calves except for the 1961 estimate.

<sup>b</sup> Data presented by R.O. Skoog at the 1962 Alaska Science Conference.

<sup>c</sup> Aerial photo-direct count extrapolation (Davis et al. 1979).

<sup>d</sup> Valkenburg et al. 1985.

<sup>e</sup> No estimates.

TABLE 2 Porcupine caribou herd historical postcalving composition counts, 1971–1992<sup>a</sup>

Approximate survey date	Bulls:100 Cows <sup>b</sup>	Calves:100 Cows	Percent calves	Percent cows	Percent yrlgs	Percent small bulls (% of bulls)	Percent large bulls (% of bulls)	Percent bulls	Composition sample size
7/71	24	38	21	56	10			13	29,197
7/72	23	49	26	53	9			12	11,721
7/73	16	47	27	58	6			9	19,101
7/74	9	67	37	55	3			5	14,127
7/75	23	52	27	52	9			12	18,814
7/76	5	58	32	55	10			3	13,762
7/77	7	39	24	61	11			4	25,520
7/78	30	68	32	47	7			14	18,669
7/79	15	55	30	55	7			8	19,154
7/80	59	66	26	39	11			23	9,046
7/82 <sup>c</sup>	95	43	15	36	15		46	34	19,718
7/83	9	73	38	52	5	61	39	5	2,583
7/86 <sup>c</sup>	57	52	22	42	12			24	19,499
7/87 <sup>c</sup>	72	62	24	38	10	49	51	28	33,044
7/88	28	54	27	50	10	57	43	14	6,420
7/89	17	46	25	55	11	77	23	9	23,242
7/90 <sup>d</sup>									
7/91	36	46	28	46	10			17	16,060
7/92	27	55	27	49	10	62	38	13	18,217

<sup>a</sup> Beginning in 1993 composition data were obtained from observations of radiocollared cows (see Table 3).

<sup>b</sup> These figures do not represent overall herd composition of bulls. Accurate bull:cow ratios are usually obtainable only during or prior to the rut in Oct.

<sup>c</sup> Only these surveys sampled all portions of the herd, including bull groups.

<sup>d</sup> No counts completed.

TABLE 3 Porcupine caribou herd demographic data, 1987–2004

Birth year	Early June calving surveys		Late June Calves:100 Cows <sup>b</sup>	March Calves:100 Cows <sup>c</sup>	Population estimate
	Cows observed <sup>a</sup>	Parturition rate			
1987	51	0.78	55		165,000
1988	91	0.84	55		
1989	74	0.78	58	43	178,000
1990	74	0.82	74		
1991	77	0.74	61	22	160,000
1992	78	0.86	49	33	
1993	63	0.81	45	32	152,000
1994	98	0.91	70	40	
1995	95	0.69	59	41	
1996	74	0.89	72	46	
1997	48	0.75	58	38	129,000
1998	58	0.83	68	27	
1999	39	0.84	70	56	
2000	44	0.73	44	28	
2001	70	0.84	51	31	123,000
2002	68	0.87	56	38	
2003	70	0.87	69	33	
2004	74	0.82			

<sup>a</sup> Number of radiocollared cows observed in May and June.<sup>b</sup> Includes only radiocollared adult cows  $\geq 3$  years old.<sup>c</sup> As of Mar of the year following birth of each cohort. Includes all cows  $>1$  year old.

TABLE 4 Porcupine caribou herd harvest, regulatory years 1984–1985 through 2003–2004

Regulatory year	Reported				Estimated unreported			Total
	M	F	Unk	Total	Alaska	Canada	Total	
1984–1985	49	4	0	53	500–700	4000	4500–4700	4553–4753
1985–1986	52	12	1	65	500–700	4000	4500–4700	4565–4765
1986–1987	70	14	0	84	1000–2000	500–1000	1500–3000	1584–3084
1987–1988	106	22	1	129	<500	2000–4000	2500–4500	2629–4629
1988–1989	82	7	0	89	<500	2000–4000	2500–4500	2589–4589
1989–1990	104	8	0	112	500–700	2000	2500–2700	2612–2812
1990–1991	19	1	0	20	100–150	1680	1780–1830	1800–1850
1991–1992	101	3	0	104	100–150	2774	2874–2904	2978–3028
1992–1993	78	1	0	79	658	1657	2315	2394
1993–1994	77	5	0	82	250	2934	3184	3266
1994–1995	72	3	0	75	200	2040	2240	2315
1995–1996	61	7	0	68	200	2069	2269	2337
1996–1997	76	2	0	78	200	2159	2359	2437
1997–1998	58	4	1	63	300	1308	1608	1671
1998–1999	83	11	1	95	300	— <sup>a</sup>		
1999–2000	84	4	0	88	400	— <sup>a</sup>		
2000–2001	62	10	0	72	300	— <sup>a</sup>		
2001–2002	105	9	0	114	400	— <sup>a</sup>		
2002–2003	72	3	1	76	300	— <sup>a</sup>		
2003–2004	90	4	0	94	500	— <sup>a</sup>		

<sup>a</sup> Canadian data unavailable.

TABLE 5 Porcupine caribou herd nonlocal<sup>a</sup> and nonresident hunter success, regulatory years 1991–1992 through 2003–2004

Regulatory year/ Hunters	Unit				Total Units 25 and 26C
	25A	25B	25D	26C	
<i>1991–1992</i>					
Total hunters	62	8	2	22	94
Successful	43	1	0	7	51
% Successful	69	13	0	32	54
<i>1992–1993</i>					
Total hunters	67	23	0	6	96
Successful	48	11	0	4	63
% Successful	72	48	0	67	66
<i>1993–1994</i>					
Total hunters	45	9	1	28	83
Successful	33	1	1	19	54
% Successful	73	11	100	68	65
<i>1994–1995</i>					
Total hunters	49	13	2	14	78
Successful	36	2	0	8	46
% Successful	73	15	0	57	58
<i>1995–1996</i>					
Total hunters	57	9	1	21	88
Successful	32	2	0	10	44
% Successful	56	22	0	48	50
<i>1996–1997</i>					
Total hunters	47	20	0	9	76
Successful	29	16	0	2	47
% Successful	62	80	0	22	62
<i>1997–1998</i>					
Total hunters	56	10	3	17	86
Successful	34	5	0	6	45
% Successful	61	50	0	35	52
<i>1998–1999</i>					
Total hunters	85	12	3	17	117
Successful	63	3	2	9	77
% Successful	74	25	67	53	66
<i>1999–2000</i>					
Total hunters	80	23	146	6	125
Successful	55	14	5	3	74
% Successful	69	61	3	50	59

Table 5 continued

Regulatory year/ Hunters	25A	Unit 25B	25D	26C	Total Units 25 and 26C
<i>2000–2001</i>					
Total hunters	91	13	12	6	122
Successful	56	0	2	2	60
% Successful	61	0	17	33	49
<i>2001–2002</i>					
Total hunters	121	27	14	14	176
Successful	85	5	2	9	101
% Successful	70	18	14	64	57
<i>2002–2003</i>					
Total hunters	98	21	23	12	154
Successful	65	5	2	4	76
% Successful	66	24	9	33	49
<i>2003–2004</i>					
Total hunters	94	28	14	19	155
Successful	63	18	0	13	94
% Successful	66	64	0	68	61

<sup>a</sup> Nonlocal includes Alaskans residing outside Units 25, 26B, and 26C.



## **CARIBOU MANAGEMENT REPORT**

From: 1 July 2002  
To: 30 June 2004

### **LOCATION**

**GAME MANAGEMENT UNIT:** Western half of Unit 25C and small portions of northern Unit 20B and eastern Unit 20F (3090 mi<sup>2</sup>)

**HERD:** White Mountains

**GEOGRAPHIC DESCRIPTION:** White Mountains area north of Fairbanks

### **BACKGROUND**

As recently as 1960, 30,000 animals from the Fortymile caribou herd (FCH) crossed the Steese Highway to calve and summer in the White Mountains (Jones 1961). As the FCH declined throughout the 1960s, these caribou abandoned the traditional White Mountains calving area and remained southeast of the Steese Highway. However, in the late 1970s, public reports and incidental observations by biologists confirmed the year-round presence of caribou in the White Mountains, implying a small resident herd had existed for many years (Valkenburg 1988).

When the White Mountains caribou herd (WMCH) was first discovered in the late 1970s, it numbered 100–200 caribou (Valkenburg, ADF&G, personal communication). The federal Bureau of Land Management (BLM) estimated the herd's size at around 1000 caribou in the mid 1980s (Valkenburg 1988), although the basis for this estimate is unknown. In a photocensus on 6 July 1992, J. Herriges (BLM) counted 832 caribou but extrapolated the estimate to 1200, based on missing radiocollared animals and a rough estimate of herd composition. In retrospect, it seems most likely the herd grew from about 150 in 1978 to around 900 in 1992 ( $\lambda = 1.14$ ).

The White Mountains National Recreation Area is managed by BLM and encompasses most of the WMCH's range. The recreation area was created by the Alaska National Interest Lands Conservation Act in 1980. In 1982 BLM and ADF&G initiated a cooperative project to determine the identity and distribution of caribou in the White Mountains. Caribou radiocollared during that project provided information on herd movements and distribution. The WMCH also provides a low-density comparison population for the long-term Delta herd research project.

Public use of the White Mountains is increasing, especially during late winter. BLM continues to improve access and increase recreational opportunities through development of roads, trails, and cabins. Despite this increased access, annual reported harvests have been

low. In 1990, 2 drawing permit hunts (DC877 and DC878) were established to provide opportunity to hunt caribou in winter. DC877 allowed motorized access hunting, while DC878 was nonmotorized access only. Although 100 permits were issued for the first 3 seasons (50 per hunt), success was low (6 caribou). The number of permits available was increased to 250 (125 per hunt) during regulatory years (RY) 1993 and 1994 (RY = 1 Jul through 30 Jun; e.g., RY00 = 1 Jul 2000 through 30 Jun 2001). However, the increase did not produce an increase in harvest, and participation dropped until there were more permits available than applicants. During the March 1998 Board of Game meeting, drawing permit hunts DC877 and DC878 were changed to registration hunts RC877 and RC878 with an unlimited number of permits available. Regulations were further liberalized at the March 2000 Board of Game meeting. The fall general season bag limit was changed from 1 bull to 1 caribou, and RC877 and RC878 were combined to create RC879, which had season dates of 1 November through 31 March and no motorized restrictions. However, the area open to hunting the WMCH was reduced.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT GOALS**

- Ensure that increased recreational use and mining development do not adversely affect the White Mountains Herd.
- Provide the greatest sustained opportunity for hunting caribou.
- Provide an opportunity to view and photograph caribou.

### **MANAGEMENT OBJECTIVES**

- Maintain a stable or increasing population with a fall bull:cow ratio of at least 30 bulls:100 cows.

## **METHODS**

### **POPULATION STATUS AND TREND**

#### *Population Size*

ADF&G estimated population size using the radio-search technique (Valkenburg et al. 1985). We photographed groups of caribou from an aircraft with a handheld Olympus Stylus 400 digital camera. The herd was surveyed on 25 June 2004 using a radiotelemetry-equipped Bellanca Scout fixed-wing aircraft. The minimum count was 642 caribou and the estimated population size was 733. All radio collars were accounted for during the survey.

In our attempt to maintain at least 20 radiocollared caribou in the WMCH to aid in estimation of herd dynamics, we deployed radio collars on 3 female caribou calves on 28 October 2002 and 6 female caribou calves on 9 October 2003, bringing the total number of active radio collars to approximately 15 by the end of this reporting period. Mean weight of calves

collared was 121 lb (range 99–135) in 2002 and 137 lb (range 130–141) in 2003. The only calf radiocollared in 2004 weighed 153 lb.

### *Population Composition*

We conducted composition surveys on 24 September 2002 and 5 October 2003 using an R-22 helicopter and a Bellanca Scout aircraft. The biologist in the fixed-wing aircraft located the radiocollared caribou. Observers in the R-22 helicopter classified caribou that were in groups with radiocollared animals and also classified any caribou found in a search of the surrounding area. We broadly searched areas containing numerous radiocollared caribou for additional groups. We also classified any caribou encountered while in transit between search areas. Classification categories consisted of cows; calves; and large, medium, and small bulls. Observers identified bulls by the absence of vulva and classified bulls by antler characteristics (Eagan 1993). We tallied the composition of each group on a 5-position counter and recorded the tallies on a data sheet. In general, we surveyed groups of caribou located mainly in the Lime Peak and Preacher Creek areas in 2002 and 2003. Survey conditions were good in 2002 and 2003 with clear or high overcast skies and mild winds. We classified 405 and 308 caribou in 2002 and 2003 respectively (Table 1).

## **MORTALITY**

### *Harvest*

We estimated harvest by using data from returned harvest tickets and registration permit report cards. For RY02 and RY03, caribou harvested west of Preacher and American Creeks and north of the Steese Highway were considered WMCH animals; caribou harvested east of these drainages and/or south of the Steese Highway were considered FCH animals. To separate the White Mountains herd from the Ray Mountains herd harvest in Unit 20F, caribou killed south of the Yukon River were considered WMCH animals. Harvest data were summarized by regulatory year.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

#### *Population Size*

The June 2004 population estimate of 733 caribou was similar to the 2000 population estimate of 687–800 caribou. The WMCH population level could be considered stable during RY02 and RY03.

#### *Population Composition*

Fall calf:cow and bull:cow ratios in the WMCH have been variable (Table 1). However, productivity and early calf survival appeared sufficient (>25 calves:100 cows) to suggest herd growth in most years. Bull:cow ratios remained relatively high and met objectives. Variation in bull:cow ratios (23–62:100) for the WMCH probably reflected biased sampling because bulls are often segregated after the rut (e.g., surveys conducted in 1991 and 1995). Surveys conducted early in the fall (i.e., 29 Sep–6 Oct) yielded higher bull:cow ratios than surveys conducted later. Differences in composition among years may also be attributed to the

behavior of the WMCH. Because these caribou are usually in small, scattered groups and in timbered areas, it is easy to miss groups that could affect the overall composition estimates.

#### *Distribution and Movements*

Radiocollared WMCH animals were located infrequently; therefore, data concerning their movements are minimal. Limited data suggest the herd calves primarily in the higher elevations east of Beaver Creek, including the Nome, Fossil, Cache, and Preacher Creek drainages. Some scattered calving occurs west of Beaver Creek (Durtsche and Hobgood 1990). Postcalving aggregations occur from mid June to late July east of Beaver Creek to Mount Prindle. In August or September, White Mountains caribou often move north of Beaver Creek and winter in upper Hess and Victoria Creeks and the upper Tolovana River drainages, although some winter in the Preacher Creek drainage west of Circle.

### **MORTALITY**

#### *Harvest*

##### Season and Bag Limit.

	RY90–RY97	RY98–RY99	RY00–RY01	RY02–RY03
Fall general season <sup>a</sup>	10 Aug–20 Sep			
Hunt area	Units 20B, 20F, and 25C, north and east of the Elliott and Dalton Highways, and north and west of the Steese Highway.		Units 20B and 20F north and east of the Elliott and Dalton Highways, and north and west of the Steese Highway, and Unit 25C west of Preacher and American Creeks.	
Bag limit	1 bull		1 caribou	1 bull
Motor vehicle restrictions	None			
Winter season <sup>a</sup>	Drawing; 1 Feb–31 Mar	Registration; 1 Nov–31 Mar		Registration; 1 Dec–31 Mar
Hunt area	Units 20B, 20F, and 25C, north and east of the Elliott and Dalton Highways, and north and west of the Steese Highway.		Units 20B and 20F north and east of the Elliott and Dalton Highways, and north and west of the Steese Highway, and Unit 25C west of Preacher and American Creeks.	
Bag limit	1 caribou			
Motor vehicle restrictions	Yes		No	

<sup>a</sup> Residents and nonresidents.

Alaska Board of Game Actions and Emergency Orders. No emergency orders were issued by the department during this reporting period.

At the March 2002 meeting, the board changed the fall general season bag limit back to 1 bull and changed the registration hunt (RC879) dates to 1 December–31 March, beginning in RY02. These changes provided consistent caribou hunting regulations along the Steese Highway. Previous board actions are addressed in the Background section of this report.

Hunter Harvest. Harvest during fall hunts was low from RY87 to RY99 (range 6–26). Fall harvest peaked in RY00 at 51 (Table 2) when Fortymile caribou herd animals came north of the Steese Highway and may have been the source of many of the 51 caribou taken. Additionally, RY00 was the first year that cow caribou were legal in the fall hunt, and harvest of cows contributed 20 of the 51 caribou in the reported harvest. The bag limit was changed back to bull only in RY02, and the FCH has not returned to the area in large numbers during the general seasons during RY01–RY03. Due to these factors, the fall harvest declined to normal levels during RY01–RY03.

Permit Hunts. Participation was high and harvests were low for registration hunt RC879 (Table 3) in RY02; 313 permits were issued and 2 bull caribou were reported harvested. In RY03, 259 permits were issued, with a reported harvest of 1 bull caribou.

To estimate a harvest quota for the winter hunt, we used a computer population model designed by P. Valkenburg and D. Reed (ADF&G). The model indicated the WMCH could sustain a maximum total fall and winter harvest of 40 bulls and 25 cows. The higher-than-average harvest in RY00 approached sustainable limits with 34 bulls and 26 cows taken, but harvest has remained well below sustainable limits during RY01–RY03.

A high ratio of large bulls:100 cows is an indication of bull harvest below sustainable limits. The proportion of large bulls per hundred cows averaged 13 during RY92–RY01 (Table 1), and 9 during RY02–RY03. Based on reported harvest and population modeling, the lower large bull:100 cow ratio seen in RY02 and RY03 is likely a result of caribou distribution during composition surveys rather than overharvest. However, these data suggest the large bull segment of the WMCH should be monitored for a decreasing trend in years to come.

Hunter Residency and Success. The majority of WMCH caribou were harvested by resident hunters who are mostly local residents (Table 4). Success rates were usually quite low in both fall and winter hunts. The low success rates were probably due to the inaccessibility of caribou during both seasons, but may have been further reduced in recent years due to the popularity of the FCH hunts nearby. Many FCH hunters who traveled the Steese Highway also obtained a general season harvest ticket or a RC879 permit for the chance to take a caribou as they passed through the range of the WMCH. This tended to artificially reduce success rates for the WMCH hunts.

Harvest Chronology. From RY90 (when the winter seasons were opened) to RY03, 58–100% of the harvest occurred during the fall season (10 Aug–20 Sep). In RY02 and RY03, 86% of the harvest occurred during the fall season.

Transport Methods. The most common method of transportation used by successful hunters during the fall seasons in RY02 and RY03 was 3- or 4-wheelers, which accounted for 83% of transportation use in both years (Table 5). Because of limited participation and low harvests, transportation methods for the winter hunts have little meaning, but in hunts where motorized access was allowed, the vast majority of the harvest was by snowmachine.

Winter travel in the White Mountains can be difficult for hunters, but extension of developed trails and cabins provided by BLM is making winter access easier. However, access trails have not been well developed in caribou wintering areas, and caribou frequent dense spruce forest in winter, making hunting difficult.

## **CONCLUSIONS AND RECOMMENDATIONS**

We met the objective for this reporting period, which was to maintain a stable or increasing population with a fall bull:cow ratio of at least 30 bulls:100 cows. The photocensus suggests that the population number is stable, and the fall composition counts indicated a bull:cow ratio of 35:100.

As the FCH harvest is liberalized, hunting pressure on the WMCH seems to have decreased. However, with BLM's improved access in this area, increased hunter effort and harvest during fall may occur in the future if opportunities to hunt other Interior caribou decline.

Population data for the WMCH are generally limited to annual composition counts with an occasional census. To obtain a better understanding of population dynamics of the WMCH we need to allocate more funds to more intensive census efforts. Relatively low herd size and hunter success have made funding allocations for this herd a low priority compared to other Interior caribou herds.

By working closely with BLM, we monitored increases in recreational uses and development. We should continue to contribute to meetings about development of BLM lands. This cooperation will help effect better management strategies for the WMCH.

The protection of key seasonal ranges from mining and recreational development should be considered during any land-use planning. Key ranges include known and historic calving areas, summer ranges, wintering areas, and movement corridors.

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**PREPARED BY:**

C. Tom Seaton  
Wildlife Biologist II

**SUBMITTED BY:**

Doreen I. Parker McNeill  
Assistant Management Coordinator

**REVIEWED BY:**

Mark A. Keech  
Wildlife Biologist III

Laura A. McCarthy  
Publications Technician II

Please cite any information taken from this section, and reference as:

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TABLE 1 White Mountains caribou herd fall composition counts and estimated population size, 1983–2004

Date	Bulls:100 Cows	Large bulls: 100 Cows	Calves:100 Cows	% Calves	% Cows	% Small bulls	% Medium bulls	% Large bulls	% Total bulls	Composition sample size	Estimate of herd size
9/29/83	44	19	31	18	57	26	29	44	25	135	
10/85	36		31	18	60				22	65	
9/29/88	43	14	33	19	57	51	16	33	24	211	
10/06/89	50	11	36	19	54	46	33	22	27	744	750–1000
10/11/91	23	5	24	16	68	44	35	21	15	312	
10/29/91 <sup>a</sup>				15						324	761 <sup>b</sup> –1000
10/13/92	39	12	23	14	62	52	18	30	24	247	832 <sup>b</sup> –1000
9/27/93	48	21	22	13	59	34	23	43	28	497	
10/04/94	39	16	25	15	61	34	24	42	24	418	
10/16–17/95	36	10	31	19	60	44	27	29	22	418	
10/2/96	44	9	54	27	50	60	20	20	22	513	
10/2/97	34	11	38	22	58	50	19	31	20	341	
10/2/98	50	11	18	11	60	42	37	21	30	759	
9/30/99	62	16	39	20	47	33	40	26	31	644	
9/29/00	54	11	13	8	60	40	40	20	32	399	687 <sup>b</sup> –800
9/25/01	57	11	26	14	55	46	36	19	31	441	700–800
9/24/02	34	7	29	18	61	44	35	21	21	405	
10/5/03	30	11	17	11	68	40	22	38	20	308	
10/5/04	35	6	23	15	63	32	49	18	22	321	733 <sup>c</sup>

<sup>a</sup> Fixed-wing aircraft.<sup>b</sup> Actual count of herd size.<sup>c</sup> Summer 2004 photo census estimate.



TABLE 2 White Mountains caribou harvest during fall general season<sup>a</sup>, regulatory years 1987–1988 through 2003–2004

Regulatory year	General season harvest			
	M	F	Unk	Total
1987–1988	6	0	0	6
1988–1989	12	0	0	12
1989–1990	14	0	0	14
1990–1991	17	0	1	18
1991–1992	19	0	0	19
1992–1993	15	0	0	15
1993–1994	21	0	0	21
1994–1995	18	0	0	18
1995–1996	10	0	0	10
1996–1997	17	0	0	17
1997–1998	25	0	0	25
1998–1999	13	0	0	13
1999–2000	26	0	0	26
2000–2001	30	20	1	51
2001–2002	15	8	0	23
2002–2003	11	0	1	12
2003–2004	6	0	0	6

<sup>a</sup> Excludes winter permit hunt harvest.

TABLE 3 White Mountains caribou herd harvest by permit hunt, regulatory years 1990–1991 through 2003–2004

Hunt	Regulatory year	Permits issued	Did not hunt (%)	Unsuccessful hunters (%)	Successful hunters (%)	Bulls	Cows	Unk	Harvest
DC877 & DC878	1990–1991	89	66 (74)	18 (86)	3 (14)	2	1	0	3
	1991–1992	100	88 <sup>a</sup> (88)	12 (100)	0 (0)	0	0	0	0
	1992–1993	100	76 (76)	19 (86)	3 (14)	1	2	0	3
	1993–1994	150	120 (80)	26 (100)	0 (0)	0	0	0	0
	1994–1995	149	116 (78)	26 (90)	3 (10)	1	2	0	3
	1995–1996	137	98 (72)	37 (100)	0 (0)	0	0	0	0
	1996–1997	106	86 (81)	17 (100)	0 (0)	0	0	0	0
	1997–1998	67	46 (69)	20 (95)	1 (5)	1	0	0	1
RC877 & RC878	1998–1999 <sup>b</sup>	74	25 (34)	49 (98)	1 (2)	0	1	0	1
	1999–2000	119	28 (24)	91 (88)	13 (13)	3	10	0	13
RC879	2000–2001	333	137 (41)	178 (95)	10 (5)	4	6	0	10
	2001–2002	405	252 (62)	128 (88)	17 (12)	15	1	1	17
	2002–2003	313	200 (64)	111 (98)	2 (2)	2	0	0	2
	2003–2004	259	198 (76)	60 (98)	1 (2)	1	0	0	1

<sup>a</sup> Includes those that did not report.<sup>b</sup> Registration hunt with an unlimited number of permits available.

TABLE 4 White Mountains caribou herd hunter residency and success during fall general seasons, regulatory years 2002–2003 and 2003–2004

Regulatory year	Successful				Unsuccessful				Total hunters
	Local <sup>a</sup> resident	Nonlocal resident	Nonresident	Total (%)	Local <sup>a</sup> resident	Nonlocal resident	Nonresident	Total (%)	
2002–2003	9	2	1	12 (7)	107	41	11	159 (93)	171
2003–2004	4	1	1	6 (4)	98	39	3	140 (96)	146

<sup>a</sup> Residents of Units 20 and 25C.

TABLE 5 White Mountains caribou herd harvest<sup>a</sup> by transport method during fall general seasons, regulatory years 1988–1989 through 2003–2004

Regulatory year	Harvest by transport method								<i>n</i>
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Other/Unk	
1988–1989	4	0	0	4	0	2	2	0	12
1989–1990	0	0	0	4	0	4	4	2	14
1990–1991	1	0	1	10	0	1	4	1	18
1991–1992	3	1	0	8	0	4	3	0	19
1992–1993	2	0	0	4	0	2	5	1	14
1993–1994	4	0	0	11	0	0	5	1	21
1994–1995	0		1	13	0	1	3	0	18
1995–1996	4	0	0	4	0	0	2	0	10
1996–1997	1	0	0	12	0	1	3	0	17
1997–1998	5	0	1	14	0	2	1	2	25
1998–1999	1	0	1	9	0	1	1	0	13
1999–2000	2	0	2	17	1	2	1	1	26
2000–2001	1	1	2	37	2	6	2	0	51
2001–2002	0	0	0	17	0	1	5	0	23
2002–2003	0	1	0	10	0	1	0	0	12
2003–2004	0	0	1	5	0	0	0	0	6

<sup>a</sup> Excludes winter permit hunts.

## **CARIBOU MANAGEMENT REPORT**

From: 1 July 2002

To: 30 June 2004

### **LOCATION**

**GAME MANAGEMENT UNIT:** 26A (56,000 mi<sup>2</sup>)

**HERD:** Teshekpuk

**GEOGRAPHIC DESCRIPTION:** Western North Slope

### **BACKGROUND**

The presence of old drive sites near Teshekpuk Lake indicates that caribou have been hunted in the area since at least late prehistoric times (Silva et al. 1985). The area was used extensively for reindeer herding in the 1930s and 1940s, and local residents report observing caribou in the area since the 1930s. Davis and Valkenburg (1978) documented the Teshekpuk Caribou Herd (TCH) in the mid 1970s as a separate herd from the Central Arctic (CAH) and the Western Arctic (WAH) caribou herds.

Alaska Department of Fish and Game (ADF&G) and U.S. Bureau of Land Management (BLM) staff completed visual counts during 1978–1982 and estimated that 3000–4000 caribou inhabited the Teshekpuk Lake area (Davis and Valkenburg 1979; Reynolds 1981; Silva et al. 1985). In an effort to assess the size and distribution of the TCH, 12 cows and 8 bulls were instrumented with radio collars in 1980 and monitored jointly by ADF&G and BLM. During July 1984, the first photocensus of the herd was completed using a modified aerial photo-direct count extrapolation (APDCE) technique; ADF&G and BLM staff counted 11,822 animals from photographs. Trent and Toovak made a visual count in 1985 and counted 13,406 caribou (ADF&G files). We completed photocensuses and counted 16,649 caribou in 1989 (Carroll 1992), 27,686 in 1993 (Carroll 1995), 25,076 caribou in 1995 (Carroll 1997), 28,627 in 1999 (Carroll 2001), and 45,166 in 2002 (Carroll 2003).

The TCH is an important subsistence resource to hunters from several North Slope villages. Approximately 2500 caribou were harvested from the TCH during 1999–2000 (Carroll 2001) and 2766 in 2000–2001 (Carroll 2003).

### **MANAGEMENT DIRECTION**

#### **MANAGEMENT GOALS**

- Maintain stable or increasing numbers of caribou in the TCH.
- Provide continued hunting opportunity on a sustained yield basis.

## **MANAGEMENT OBJECTIVES**

- Determine the population size of the herd every 2–3 years.
- Monitor recruitment and calf production through late winter recruitment and summer calving ground surveys each year.
- Define critical habitat areas, such as calving, insect relief, and wintering areas.
- Identify and map the movements and distribution of the herd throughout the year using aerial survey, radiotelemetry, and satellite telemetry data.
- Encourage local participation in research and management decisions.
- Work with the North Slope Borough and the ADF&G Subsistence Division to collect harvest information.
- Determine the hunter-induced mortality rate and significant sources of nonhunter mortality.
- Monitor mortality events through radiotelemetry, field observations, and sample collection.
- Work with management agencies, oil companies, and caribou users to minimize conflicts between the herd and major exploration and development projects.
- Collar caribou every 1–2 years to maintain a sample size of around 40 operational collars. Capture caribou without the use of drugs.
- Weigh measure and collect blood, fecal, and hair samples from all captured caribou to gain information about disease, parasites, contaminants, and condition.
- Conduct composition surveys during midsummer and fall to determine relative numbers of bulls, cows, and calves.
- Involve students in caribou research operations, work with students to track satellite-collared caribou movements, and lecture to school classes about caribou biology.

## **METHODS**

A modified APDCE photocensus (Davis et al. 1979) of the TCH was successfully completed in 2002. Photographs were taken from a DeHavilland Beaver (DHC-3) aircraft with a floor-mounted camera on 16 July while TCH caribou were in insect relief aggregations. Cessna 185 and Piper PA 18 aircraft with telemetry equipment were used to detect how many radiocollared TCH animals were in the photographed groups and if there were any instrumented WAH or CAH caribou in the area. Images of caribou on the photographs were counted during the following winter. A census was attempted in 2004 but was unsuccessful due to weather conditions.

Spring short yearling and fall composition surveys were flown using a Piper PA 18 on 1 and 6 April 2003, 6 and 10 April 2004, 25 and 26 October 2002, and on 28 October 2004. We used telemetry equipment to locate radiocollared cows and counted approximately 100 adults and calves in the area surrounding the collared animals. Locating the radiocollared animals helped us distribute our sampling effort throughout the range of the TCH.

Calving surveys were flown using a Piper PA 18 on 2–13 June 2003 and 3–12 June 2004. Weather permitting, we flew surveys every 1 to 3 days over most of the TCH range and used telemetry equipment to locate as many collared cows as possible. The cows were observed at close range to determine the success, timing, and location of calving. For each observation we recorded the location using a Garmin Global Positioning System (GPS) receiver; recorded presence or absence of a calf; and recorded antler condition (hard, soft, or none) and presence or absence of a visible udder. Cows with soft antlers (covered with velvet) were listed as nonparturient. We continued to observe other collared cows until they were seen with a calf, and that was recorded as the approximate calving location. For cows that were never seen with a calf, we recorded their location midway through the observation period as their location during calving. ArcView GIS was used to map locations of cows that calved successfully (were seen with a live calf) and those that did not calve successfully (were not seen with a live calf).

Through a cooperative effort with the North Slope Borough and BLM, we captured 14 caribou (11 females and 3 males) north of the Inigok landing strip on 8 and 9 September 2002 and attached 10 Platform Transmitter Terminal collars (PTT = satellite radiocollar transmitters) and 4 VHF radio collars. We also captured 26 caribou (6 males and 20 females) north and west of Teshekpuk Lake on 26–27 June 2003 and attached 20 PTT and 6 VHF radio collars. We captured caribou using a hand-held net gun fired from a Robinson R44 helicopter and restrained them using hobbles, ropes, and blindfolds. We collected blood, fecal, and hair samples and measured, weighed, and assessed the body condition of the captured caribou. The radio collars were used to aid in population, productivity, and movement studies.

The PTTs were designed to transmit on a 6-hour per 48-hour duty cycle. We received satellite location data from the Service Argos Data Collection and Location System (ARGOS) in Landover, Maryland using 2 methods. We retrieved current location information from ARGOS, using a computer and modem as needed. Otherwise, we used monthly summaries of all locations distributed on microcomputer files by ARGOS. In addition to receiving caribou locations from ARGOS, we completed periodic VHF radiotracking flights to collect information on caribou mortality, movements, and distribution.

In order to determine hunter harvest of TCH caribou, we examined data from harvest surveys that have been done in villages within the range of the TCH. Harvest surveys have been done in Atqasuk, Barrow, and Nuiqsut by the ADF&G Subsistence Division during the last 2 years, so we were able to use their estimates for the total number of caribou harvested. For the other villages we used the estimated harvest from past survey reports and the human population for the year of the survey to calculate the number of caribou harvested per person per year. We obtained current human population estimates from the Department of Commerce, Community and Economic Development and multiplied this by the per capita harvest for each village to estimate the total caribou harvest for 2002–2003. Because villages harvest caribou from more than one herd, we had to use telemetry information to estimate the percentage of caribou from each herd

that were in the village hunting areas when hunting was taking place, and therefore, the percentage of Teshekpuk caribou harvested in each village. We multiplied the total number of caribou harvested times the percentage of caribou that were estimated to be from the TCH to determine the total number of TCH caribou harvested by each village, and then totaled these to calculate the total TCH harvest. We recognize that the harvest estimates (calculated above) are based on approximate proportions of caribou from respective herds in the local hunting areas. Increased confidence in the estimation procedure is possible in the future with more VHF radiotracking flights and more analysis of satellite collar information to determine when caribou from the various herds are present in village hunting areas.

We determined mortality rates of radiocollared caribou by examining radiotracking survey data. The VHF transmitters attached to all the collars were configured with MS6 mortality sensors that doubled their rate of transmission when the caribou stopped moving for over 5.5 hours (mortality mode). We totaled the number of caribou found on mortality mode for each collaring year, which ran from when collars were attached one year to when they were attached the next year, approximately 1 July–30 June. We then divided this by the number of active radio collars that were on the air at the beginning of the collar year to calculate the mortality rate for each year. From 1990 to 1998 we did not include data collected from caribou instrumented with PTTs because they had a higher mortality rate than those collared with VHF collars. Beginning in 2000, improvements in the design of the PTTs eliminated the difference in mortality rates; since then, we used data from both types of collars. We began collaring males as well as females in 2001, so mortality information for both males and females is included beginning in 2001–2002.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

#### *Population Size*

From census photographs taken on 16 July 2002, we counted 45,166 caribou. Previous censuses in 1989 (16,649 caribou), 1993 (27,686 caribou), 1995 (25,076 caribou), and 1999 (28,627) indicated that the TCH increased at a rate of 14% per year during the period 1989–1993, and then the counts appeared to stabilize from 1993 until 1999 (Table 1).

It seems unlikely that the herd could have achieved the growth rate of 16.2% per year that would have been required to increase from 29,000 in 1999 to 45,000 caribou in 2002, particularly when there was poor recruitment (9%) in 2001–2002 and mediocre recruitment (15%) in 2000–2001 (Table 3). It is more probable that the census in 1999, and possibly the census in 1995, undercounted the population and that the herd has been steadily increasing through the 1990s. There were several years of good recruitment between 1995 and 1999 (24%, 21%, 14%, 21%, respectively), and it seems quite possible for the herd to have achieved the growth rate that would have been required. We attempted a census in 2004 but were unsuccessful due to unfavorable weather conditions.

#### *Population Composition*

Calving. In 2003 calving surveys were flown on 2, 3, 4, 5, 6, 9, 11, and 13 June. We located 34 collared cows, and 23 of these had calves at heel, for a calf:cow ratio of 65 calves:100 cows (Table 2).

In 2004 surveys were flown on 3, 5, 6, 7, 8, 11, and 12 June. We located 36 collared cows, and 16 were seen with calves, for 44 calves:100 cows, which made it one of the lowest years for calving success (Table 2). The TCH was very scattered during the winter of 2003–2004, with approximately 1/3 of the herd traveling 250 miles east of their normal range and spending the winter in the Arctic National Wildlife Refuge (ANWR) and many others traveling south of the Brooks Range. The other 2 years of lowest calving success were 1987, when the herd made an unusually long migration to the south, and 2001, when unusually deep and persistent snow conditions hindered the spring migration to the calving area.

For the first time since we have been conducting calving surveys, collared TCH animals calved in the CAH calving area. Three collared TCH cows that spent the winter in ANWR were seen with calves east of the Sagavanirktok River; 2 calved between the Sagavanirktok and the Colville Rivers, and 3 calved in the normal calving area near Teshekpuk Lake (Figure 1).

Fall composition counts. Fall composition surveys were flown on 25 and 26 October 2002. We located 26 collared caribou, including 4 bulls, 8 cows without calves, and 14 cows with calves (36 calves:100 collared cows). We classified 3510 caribou in the vicinity of the collared animals and counted 723 calves, which computed to 21% calves, or 26 calves:100 adults (Table 3). Fall surveys were not flown in 2003 because of a mechanical breakdown in the survey plane.

Short yearling counts. Short yearling counts were flown 1 and 6 April 2003. We located 18 collared cows, 6 of which had short yearlings at heel (33 calves:100 collared cows). We also classified 2141 caribou in the areas surrounding the collared animals and counted 1705 adults and 436 short yearlings. This computes to 20% short yearlings or 26 short yearlings:100 adults (Table 3).

Because a substantial portion of the herd wintered in ANWR in 2003–2004, we flew surveys there and in their normal wintering area near Atqasuk and found that the percentage of calves surviving the winter was remarkably similar in the 2 areas. We flew short yearling counts in ANWR on 6 April 2004 and located 12 collared caribou—1 was a male, 4 were cows with calves, and 7 were cows without calves (36 short yearlings:100 collared cows). We also classified 1378 caribou in the areas surrounding the collared animals and counted 1127 adults and 251 short yearlings. This computes to 18% short yearlings or 22 short yearlings:100 adults. We flew short yearling surveys in the Atqasuk area on 10 April and located 16 collared caribou—3 were males, 5 were cows with calves, and 8 were cows without calves (39 short yearlings:100 collared cows). We also classified 1314 caribou in the areas surrounding the collared animals and counted 1090 adults and 224 short yearlings. This computes to 17% short yearlings or 21 short yearlings:100 adults (Table 3).

### *Distribution and Movements*

Most TCH caribou move toward Teshekpuk Lake during May, and most of the pregnant females move into the area surrounding Teshekpuk Lake, particularly the area northeast, east, and southeast of the lake to calve in early June (Figure 2). During late June through July, caribou of both sexes seek relief from insect harassment along the Beaufort Sea coast from Dease Inlet to the mouth of the Kogru River, around the edges and on islands of Teshekpuk Lake, and on sand dunes along the Ikpiqpu River and south of Teshekpuk Lake. Fall and winter movements are highly variable. Most TCH caribou winter on the coastal plain in most years, particularly in the



areas around Atqasuk and south of Teshekpuk Lake. However, they may also winter in the foothills and mountains of the Brooks Range, as far south as the Seward Peninsula, and as far east as ANWR.

Satellite collar information indicates that TCH caribou winter in varied locations (Philo et al. 1993; Prichard 2001). In 1990–1991 about half of the herd wintered south of the Brooks Range and half were on the Chukchi coast. In 1991–1992 most of the herd wintered within 30 miles of Teshekpuk Lake. In 1992–1993 the herd was split between the northern foothills of the Brooks Range and the coastal plain. During 1993–1994, icing on the coastal plain caused most of the TCH to move into the area between Umiat and Anaktuvuk Pass, with a portion of the herd moving to the south side of the Brooks Range. During 1994–1995, most of the herd was along the Chukchi Sea coast from Wainwright to Cape Lisburne. In 1995–1996 the TCH wintered on the coastal plain, mostly between Dease Inlet and Wainwright. During 1996–1997 most of the herd traveled south of the Brooks Range and were distributed between Cape Lisburne and the Seward Peninsula. During 1997–1998 most of the herd wintered in the Atqasuk and Wainwright area, with some scattered as far east as the Teshekpuk Lake area. In 1998–1999 most of the herd wintered on the coastal plain between Atqasuk and Teshekpuk Lake. During 1999–2000, most of the herd wintered between Wainwright and Atqasuk, with another segment wintering south of Umiat. During 2000–2001 most of the herd wintered in the Atqasuk/Wainwright/Barrow area, with others spread across the coastal plain and south of Anaktuvuk Pass. Snow melt-off was very late, and the spring migration was delayed by 2 to 3 weeks. During 2001–2002 most of the cows wintered in the Atqasuk/Wainwright area, with some wintering near Teshekpuk Lake. Four of 7 collared bulls moved away from the TCH cows in early October and wintered in the CAH wintering area southeast of Anaktuvuk Pass.

In 2002–2003 the TCH was spread along the coast during the July insect season from the Teshekpuk Lake area to Barrow. Many caribou stayed in the Barrow area during the summer, providing ample hunting opportunities. During the late summer and fall, they gradually moved south and were scattered across the coastal plain. Most of the cows wintered on the coastal plain between Teshekpuk Lake and Umiat. During November and December, 4 of the 6 radiocollared bulls moved into the mountains, but stayed west of the CAH wintering area. The other 2 collared bulls remained with the cows. During June most of the collared cows calved near Teshekpuk Lake, while the bulls stayed well south of the calving area.

In 2003–2004 most of the herd moved north of Teshekpuk Lake during the July insect season and gradually moved south during late summer. During late September and early October, most of the herd was south of Teshekpuk Lake. On 8 October the herd split, with some moving west, some south, and about 1/3 of the herd traveling east about 250 miles to ANWR. The herd was extremely scattered during the winter; some were south of the Brooks Range, and substantial numbers were near the Atqasuk area and in ANWR.

The segment of the TCH that traveled to ANWR began their eastward movement south of Nuiqsut and most of the oil field infrastructure. The first major development they encountered was the trans-Alaska pipeline (TAP) and Dalton Highway (Haul Road) on 16 October, which caused them to divert north a short distance to just outside the Prudhoe Bay complex. They stayed in that area until 20 October, when they moved east past the TAP and Dalton Highway and then along the Beaufort Sea coast to ANWR. Most of the Teshekpuk caribou in ANWR

wintered in the mountains, with some wintering on the coastal plain. Hundreds of caribou were seen on and near Barter Island, providing people from Kaktovik with a winter supply of caribou, in contrast to most years.

About half of the Teshekpuk caribou that wintered in ANWR began migrating west in mid April. Two of the satellite-collared caribou (along with thousands of other TCH animals) reached the TAP/Dalton Highway in different places on 19 April and both were stopped. They remained to the east of the TAP/Dalton Highway corridor, moving north and south until 29 April, when they crossed and moved on to the west. (Figure 3)

The rest of the Teshekpuk caribou that wintered in ANWR began migrating west in mid May. Most of these (including 3 satellite-collared caribou) were stopped by a combination of the TAP, Dalton Highway, and Sagavanirktok River, which was flooding. A substantial portion of these caribou (including 3 collared caribou) stayed east of TAP during the June calving period, while others (including 2 collared caribou) stayed in the area between the Colville and Sagavanirktok Rivers (Figure 1). These 3 satellite-collared caribou, along with thousands of TCH animals, spent the summer in the CAH area.

## MORTALITY

### *Harvest*

Season and Bag Limit. The hunting seasons and bag limits were the same for both regulatory years of the reporting period.

<i>2002–2003 and 2003–2004</i>		Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit and Bag Limits			
Unit 26A			
Resident Hunters:			
5 caribou per day; cow caribou may not be taken		1 Jul–30 Jun	
16 May–30 Jun			
Nonresident Hunters:			
5 caribou total; cow caribou may not be taken			1 Jul–30 Jun
16 May–30 Jun.			

Board of Game Actions and Emergency Orders. There were no Board of Game actions or emergency orders for the TCH during the reporting period.

Human-Induced Harvest. It has been difficult to determine TCH harvest because not all hunters report their harvest and because each North Slope village harvests caribou from more than one herd. However, using the information provided by several harvest monitoring projects, as described in Methods we have been able to make a reasonable estimate of harvest from the TCH. Based on these harvest monitoring studies, we estimate that 4463 TCH caribou were harvested in

2002–2003 (Tables 4 and 5). This represents a 9.9% harvest of the herd. This is a considerable increase over the estimate of 2766 caribou harvested in 2000–2001 and results mainly from an increase in the Barrow harvest estimate. We will gain more confidence in this estimate as more harvest monitoring projects are completed, and as we increase the analysis of telemetry information.

Permit Hunts. There were no permit hunts for caribou in Unit 26A during the reporting period.

Hunter Residency and Success. Most TCH harvest is from local subsistence hunters because the area is remote and largely inaccessible to nonlocal hunters. Nonlocal resident and nonresident hunters took a small proportion of TCH caribou, primarily from the Colville River drainage. No quantitative data are available on hunter success, but we believe success rates were high.

Harvest Chronology. Caribou are harvested throughout the year, but most harvest is during July through October (Table 6 and Table 7).

Transport Methods. Caribou hunters in Unit 26A used a wide variety of transport methods. Most residents of the unit used boats and all-terrain vehicles (ATVs) during July, August, and September; and they used snowmobiles during the remainder of the year. Some use of aircraft occurs throughout the year, primarily by nonlocal residents and nonresidents. Hunters occasionally used highway vehicles when caribou moved near the limited road systems, particularly the gas well road near Barrow.

#### *Other Mortality*

We reviewed radiotracking data beginning in 1990 to determine how many collared caribou died each year and used these figures to estimate the annual TCH mortality rate. Until 2000 we had only information for collared cows, but we began collaring bulls in 2001 and have had mortality information for both sexes since then. During most years the mortality rate ranged from 11% to 17% with the average rate for all years being 16% (Table 8).

Overall, mortality was high in 2002–2003 at 20%. Five of the mortalities were among bulls, giving them a mortality rate of 50%. Mortality rate among cows was 11%, which is on the low end of the range for most years.

The mortality rate for 2003–2004 was the highest ever at 25% and was high for both bulls (29%) and cows (25%). Much of the herd migrated long distances into unfamiliar territory. The highest previous mortality rate was in 1996–1997 (24%), when much of the herd migrated south of the Brooks Range. Reasons for increased mortality in years of extraordinarily long migrations may include higher stress from the long migration, increased hunter harvest, and increased risk of predation (Carroll 1999). Another reason could be that the cause of an unusual migration is unfavorable fall conditions, such as icing, which could also increase mortality.

We have recorded sizable caribou die-offs in past years within the range of the TCH. During the winter of 1989–1990, many dead and lethargic caribou were found in an area between Teshekpuk Lake, the Ikpikpuk River, and the Colville River. We estimate approximately 2000–3000 caribou died in this area, but it is impossible to determine how many were from the TCH since caribou from the WAH and the CAH were also present in the area (Carroll 1992). During

the winter of 1992–1993 at least several hundred, and probably over 1000, caribou died in the area to the east of Teshekpuk Lake and south of the Kogru River during a period of extremely cold, windy weather. Radio collars indicated that most of these animals were from the TCH (Carroll 1995).

## **HABITAT**

### *Assessment*

Results of satellite telemetry studies (Philo et al. 1993; Prichard et al. 2001), VHF radiotracking flights, and composition surveys have indicated that the area around Teshekpuk Lake, particularly south, east, and north of the lake, is critical for calving; the area to the north of the lake is critical for insect relief and grazing; and the narrow corridors of land to the east and northwest of the lake are very important for migrating to and from the insect relief area.

In 1997 BLM began a process of opening the National Petroleum Reserve-Alaska (NPR-A), which encompasses much of the TCH range, to oil exploration and development. The first area to be considered was a 4.6-million-acre planning area in the northeast corner of NPR-A, which includes the important TCH calving, insect relief, grazing, and migration habitats located near Teshekpuk Lake. After a compilation and review of the available data and many public meetings, it was decided that 87% of the planning area would be available for oil and gas leasing. In recognition of the importance of the land around Teshekpuk Lake as crucial habitat for caribou and geese, much of it was protected. No leasing was allowed in the area north and east of the lake, and no surface structures were allowed in a strip of land to the west and south of the Teshekpuk Lake and around the Kogru River (BLM 1998). BLM is currently reassessing the previous decision and considering whether to open more of the important caribou habitat to leasing and surface structures.

### *Enhancement*

There were no habitat enhancement activities during the reporting period.

## **NONREGULATORY MANAGEMENT PROBLEMS/NEEDS**

The issue of whether to open important caribou habitat to development in northeast NPR-A is a very important management issue and will be determined as part of an ongoing process. This process will involve public input, agency recommendations, and executive decisions. ADF&G will play an important role in providing information and recommendations in this process.

## **CONCLUSIONS AND RECOMMENDATIONS**

We counted 45,166 caribou in a July 2002 photocensus, which represented an all-time high for the TCH (Carroll 2003). Trend data collected since the photocensus provide mixed results as to whether the population will increase or decline. Estimated recruitment in 2002–2003 (20%) and 2003–2004 (18%) was good. Estimated calving success was fairly high in 2003 (65%) but very low in 2004 (44%). Estimated mortality was high among collared males at 50% but low in

females at 11% in 2002–2003, and was the highest for any year that we have recorded in 2003–2004 at 25%. We will attempt a photocensus in 2005 to estimate the population trend.

During most years most Teshekpuk caribou winter on the coastal plain as they did during 2002–2003. However, during some years much of the herd makes an unexpected movement to an area that is quite distant from the normal wintering area, such as in 1996–97, when most of the herd migrated south of the Brooks Range, as far as the Seward Peninsula. During the fall and winter of 2003–2004 the herd became very widely scattered, with some of the herd traveling south of the Brooks Range, part moving west to a commonly used wintering area near Atkasuk, and about 1/3 of the herd making an unprecedented move of about 250 miles to the east and wintering in ANWR. It is difficult to explain the movement to such disparate areas, but the reason for the initial movement appeared to be bad icing conditions in the area south of Teshekpuk Lake during early October. Freezing rain on top of thawing and melting snow created a situation that would make it very difficult for caribou to feed, and they appeared to move away from it. The Teshekpuk caribou that moved east appeared to encounter unfavorable icing conditions until they reached ANWR area. According to U.S. Weather Service records, icing conditions were also worse than usual during 1996–97 and other years when the TCH made unusually extensive fall migratory movements, indicating that this may be at least part of the reason for these extensive movements.

The estimated mortality rate among collared cows in 2002–2003, when most the herd wintered on the coastal plain, was low at 11%; but it was the highest ever recorded in 2003–2004 at 25%, when much of the herd migrated long distances into unfamiliar territory. The highest previous mortality rate was in 1996–1997 (24%), when most of the herd migrated south of the Brooks Range. Reasons for increased mortality in years following extraordinarily long migrations may include higher stress from the long migration, increased hunter harvest, and increased risk of predation (Carroll 1999). Another reason could be that the fall conditions, such as icing that prompt the extensive migration, could contribute to increased mortality.

The movements of the segment of the TCH that traveled to ANWR in 2003–2004 were affected by the TAP/Dalton Highway during both their fall eastward migration and their spring westward migration. During their eastward migration, they encountered the TAP/Dalton Highway corridor on 16 October and were diverted north to just outside the Prudhoe Bay complex. They remained in that area until 20 October when they crossed the TAP/Dalton Highway and moved east along the Beaufort Sea coast to ANWR. In mid April about half of the Teshekpuk caribou that wintered in ANWR began migrating west. On about 19 April, 2 of the satellite-collared caribou (along with thousands of other TCH animals) reached the TAP/Dalton Highway corridor in different places and both were stopped. They remained to the east of the pipeline and road until 29 April, when they crossed and moved on to the west. The rest of the Teshekpuk caribou that wintered in ANWR began migrating west in mid May. Most of these (including 3 satellite collared caribou) were stopped by a combination of the TAP, Dalton Highway, and the Sagavanirktok River, which was then flooding. A substantial portion of these caribou (including 3 collared caribou) stayed east of TAP during the June calving period, while others (including 4 collared caribou) stayed in the area between the Colville and Sagavanirktok Rivers. Most of these collared caribou, along with thousands of TCH animals, spent the summer in the CAH area.

The results of several harvest monitoring projects, human population numbers, and caribou distribution data were used to estimate that approximately 4463 TCH caribou were harvested in 2002–2003. This is a considerable increase over the estimate of 2766 caribou harvested in 2000–2001 and results mainly from an increase in the Barrow harvest estimate. The surveys used in the 2000–2001 estimate of the Barrow harvest were all done before 1993, so this larger estimate probably results from using more recent information, rather than a large increase in the harvest between 2000–2001 and 2002–2003. A harvest of 4463 caribou represents a 9.9% harvest of the herd, so the herd will need to maintain a fairly high recruitment rate to sustain this level of harvest in addition to other natural mortality. This emphasizes the importance of this herd as a subsistence resource and the importance of making sure that development activities do not reduce its productivity.

Due to federal regulations and local opposition to drug use in wildlife capture, helicopters with net guns have been used to capture TCH caribou since 1990. Since 2001 we have used a hand-held net gun (as opposed to a skid-mounted net gun), which allowed the helicopter pilot to cut in front of caribou, causing the animals to hesitate, and making it possible to shoot the net when the caribou were not running full speed. There were no capture mortalities among the TCH caribou we captured from 2001 to 2004.

Radiotelemetry has been very useful in all aspects of monitoring the TCH, and satellite collars have revealed movements within the herd that were previously unknown. The radio collars have shown that during most years most of the collared caribou winter on the North Slope coastal plain, but that during other years some or most of the herd may winter in a variety of places, such as the Anaktuvuk Pass area, near Cape Lisburne, as far south as the Seward Peninsula, and as shown in 2003–2004, 250 miles east of the normal TCH range in ANWR. TCH bulls were collared for the first time in 2001, and 4 out of 7 of the satellite-collared bulls wintered in the CAH wintering area southeast of Anaktuvuk Pass. During 2002–2003, 4 of 6 collared bulls wintered in the Brooks Range mountains, but not as far east as the CAH wintering area. VHF collars have also been very useful, primarily in conducting censuses, composition surveys, and productivity studies.

The BLM is currently in the process of amending its Integrated Activity Plan/Environmental Activity Statement for the northeast section of the NPR-A, which includes much of the crucial habitat for the TCH. There are several issues that must be considered when developing the management plan for this area: 1) The TCH is a very important subsistence resource for most North Slope villages, and the herd is harvested at a relatively high rate. If development or other factors reduce productivity, it is more likely to result in a decrease in herd numbers than in herds that are not hunted as heavily. If herd numbers decline, there will be an impact on many North Slope residents. 2) The TCH has shown great fidelity to its calving area, and any activity that displaces caribou from this area could have negative population effects. There are strong selective pressures, such as avoiding predation, consuming newly emergent vegetation, and being close to the insect relief area, that make the calving area very important. Studies have shown that the CAH calving area has shifted away from developed areas and that parturition rates of cows calving in the more developed, western portion of the calving ground are lower than those for those calving in the relatively undeveloped eastern portion of the calving ground. 3) Most parturient TCH cows migrate through the narrow corridor between the east side of Teshekpuk Lake and Kogru Inlet. Caribou cows will avoid development and activity, and there

has been no way found to mitigate for this impact. Development in this corridor could easily affect the most important segment of the population. 4) Both males and females of the TCH use the insect relief area along the coast, particularly the area north of Teshekpuk Lake. Free access to and from this area must be maintained to allow caribou to escape insects and get to important grazing areas. It is important to use the best available information and to continue surveys in this area so resource managers can make informed decisions regarding the habitat of the TCH.

We have provided a variety of educational opportunities for North Slope students. Students have assisted in caribou capture operations, collected samples from captured caribou, and helped with necropsy work. Several school classes have tracked the movements of satellite-collared caribou. In addition, we have given lectures to middle school, high school, and college classes on the biology and population dynamics of caribou.

Because the TCH population remains high, we do not recommend any regulatory changes.

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**PREPARED BY:**  
Geoffry Carroll  
Wildlife Biologist III

**SUBMITTED BY:**  
Peter J. Bente  
Survey-Inventory Coordinator

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Table 1 Population estimates and average annual rate of change of the Teshekpuk caribou herd, 1978–2002

Year	Population estimate	Average annual rate of change
1978–1982	3000–4000 <sup>a</sup>	N/A
1984	11,822 <sup>b</sup>	N/A
1985	13,406 <sup>a</sup>	N/A
1989	16,649 <sup>b</sup>	7.1%
1993	27,686 <sup>b</sup>	13.5%
1995	25,076 <sup>b</sup>	-4.8%
1999	28,627 <sup>b</sup>	3.4%
2002	45,166 <sup>b</sup>	16.2% <sup>c</sup>

<sup>a</sup>Derived from visual estimate.

<sup>b</sup>Derived using aerial photocensus.

<sup>c</sup>It is unlikely that the herd increased at this rate. The 1999 count was probably an underestimation, and the herd has increased since 1995.

Table 2 Teshekpuk caribou herd calving and postcalving composition counts, June–July, 1991–2004

Calving survey <sup>a</sup>		Summer composition counts <sup>b</sup>				Composition sample size
Date	Calves:100 cows	Percent bulls	Calves: 100 cows	Percent Calves	Percent cows	
1991		13	66	35	52	3673
1992		34	80	29	37	3047
1993		37	39	15	38	2959
1994	63					
1995	73	29	73	30	41	1987
1996	86					
1997	50	18	46	26	56	3771
1998	56	31	67	28	41	3302
1999	67					
2000	85	23	63	30	47	3921
2001	44					
2002	73					
2003	65					
2004	44					

<sup>a</sup> Surveys conducted early to mid June

<sup>b</sup> Surveys conducted in July

Table 3 Spring and fall composition data for the Teshekpuk caribou herd, 1990–2004

Year	Adults	Short yearlings	Total	Short yearlings:100 adults	Percent short yearlings
1990(spring)	278	74	352	27	21
1991(spring)	532	168	700	31	24
1992(spring)	635	223	858	35	26
1993(spring)	1197	265	1462	22	18
1994(spring)	1281	205	1486	16	14
1995(spring)	1382	255	1637	18	16
1996(spring)	1787	575	2362	32	24
1996(fall)	733	191	924	26	21
1997(fall)	895	145	1040	16	14
1998(fall)	368	90	458	25	20
1999(spring)	1608	432	2040	26	21
2000(spring)	1591	394	1985	25	20
2001(spring)	1168	201	1369	17	15
2001(fall)	1295	163	1458	13	11
2002(spring)	2070	200	2270	10	9
2002(fall)	2787	723	3510	26	21
2003(spring)	1705	436	2141	26	20
2004(spring)					
ANWR*	1127	251	1378	22	18
Atqasuk*	1090	224	1314	21	17

\* In 2004 a segment of the herd traveled to ANWR, and short yearling surveys were flown both there and near Atqasuk.

Table 4 Summary of community-based harvest assessments for communities within the range of the Teshekpuk Caribou Herd, 1985–2003.

Community	Survey year	Human population	Nr of caribou harvested	Reference for harvest information
Anaktuvuk Pass	1990	314	592	Pedersen and Opie 1990
Anaktuvuk Pass	1991	272	545	Pedersen and Opie 1991
Anaktuvuk Pass	1992	270	566	Fuller and George 1997
Anaktuvuk Pass	1993	318	574	Pedersen and Opie 1993
Anaktuvuk Pass	1994–1995	318	322	Brower and Opie 1996
Barrow	1987	3016	1595	Braund et al 1991
Barrow	1988	3379	1533	Braund et al 1991
Barrow	1989	3379	1656	Braund et al 1991
Barrow	1992	3908	1993	Fuller and George 1997
Barrow	2002–2003	4581	4935	Pedersen 2005
Atqasuk	1994–1995	237	262	Hepa et al. 1997
Atqasuk	2002–2003	228	259	Pedersen 2005
Nuiqsut	1985	337	513	Pedersen 1995
Nuiqsut	1992	418	278	Fuller and George 1997
Nuiqsut	1993	361	672	Pedersen 1995
Nuiqsut	1994–1995	418	258	Brower and Opie 1997
Nuiqsut	1999–2000	468	413	Pedersen 2001
Nuiqsut	2000–2001	468	600	Pedersen (pers. comm.)
Nuiqsut	2002–2003	433	364	Pedersen 2005
Point Lay	1987	121	157	Pedersen 1989
Point Hope	1992	699	225	Fuller and George 1997
Wainwright	1988	506	505	Braund et al 1993
Wainwright	1989	468	711	Braund et al 1993
Wainwright	1992	584	748	Fuller and George 1997

Table 5 Estimated harvest of Teshekpuk Herd Caribou during the 2002–2003 regulatory year by residents living within the range of this herd.

Community	Human population	Per capita caribou harvest	Estimated total community harvest	Approximate % TCH in harvest	Estimated nr of TCH caribou harvested	Assessments used to estimate per capita caribou harvest
Anaktuvuk Pass	312	1.76	549	30	165	Anak. Pass 1990–1995
Atqasuk	228		259	60	155	2002–2003 Harvest Survey <sup>a</sup>
Barrow	4581		4935	70	3454	2002–2003 Harvest Survey <sup>a</sup>
Nuiqsut	433		364	60	218	2002–2003 Harvest Survey <sup>a</sup>
Point Lay	217	1.3	282	20	57	Pt. Lay 1987
Point Hope	792	0.32	255	0	0	Pt. Hope 1992
Wainwright	545	1.27	690	60	414	Wainwright 1988, 1989, 1992
Total Harvest					4463	

<sup>a</sup>The Estimated Total Community Harvest was derived from an ADF&G Subsistence Division harvest survey (Pedersen 2005)

Table 6 Percent and chronology of annual caribou harvest among Barrow and Wainwright residents 1987–1990<sup>a</sup>

Year	Mar–Apr	May–Jun	Jul–Aug	Sep–Oct	Nov–Dec	Jan–Feb	Annual harvest
Barrow							
1987–1988	5%	5%	40%	44%	1%	5%	1595
1988–1989	5%	6%	38%	41%	4%	6%	1533
1989–1990	6%	2%	49%	29%	3%	11%	1656
Wainwright							
1988–1989	2%	2%	31%	53%	9%	3%	505
1989–1990	11%	<1%	38%	31%	4%	15%	711

<sup>a</sup>Data from Braund et al. 1991 and 1993.

Table 7 Percent and chronology of annual caribou harvest among Nuiqsut and Atqasuk residents 1994–1995<sup>b</sup>

Village	Jul–Aug	Sep–Oct	Nov–Dec	Jan–Feb	Mar–Apr	May–Jun	Annual harvest
Atqasuk	40%	37%	14%	5%	1%	2%	187
Nuiqsut	38%	35%	7%	6%	8%	7%	249
Anaktuvuk Pass	50%	14%	12%	2%	15%	7%	322

<sup>b</sup>Data from Brower et al. 1996, 1997 and Hepa et al. 1997.

Table 8 Annual mortality for radiocollared Teshekpuk Caribou, 1990–2004

Collar Year <sup>a</sup>	Sample size <sup>b</sup>	Mortalities <sup>c</sup>	Mortality rate <sup>d</sup>
1990–1991	13	2	15%
1991–1992	21	3	14%
1992–1993	21	3	13%
1993–1994	30	4	13%
1994–1995	29	5	17%
1995–1996	31	4	13%
1996–1997	25	6	24%
1997–1998	28	4	14%
1998–1999	39	3	8%
1999–2000	37	5	14%
2000–2001*	45	5	11%
2001–2002**	49	7	14%
Males	9	0	0%
Females	40	7	17%
2002–2003	46	9	20%
Males	10	5	50%
Females	36	4	11%
2003–2004	59	15	25%
Males	7	2	29%
Females	52	13	25%
Totals	473	75	16%

<sup>a</sup> Collar year defined as 1 July–30 June.

<sup>b</sup> Sample Size – the total number of active radio collars used in the analysis at the beginning of the collar year.

<sup>c</sup> Number of radiocollared caribou that died during the collar year.

<sup>d</sup> Mortality rate – Mortalities/Sample Size.

\*Beginning in 2000–2001, caribou that were collared with PTTs or VHF radio collars were used in the analysis. Previous to 2000–2001 only VHF-collared caribou were used.

\*\*Beginning in 2001–2002, males as well as females were collared

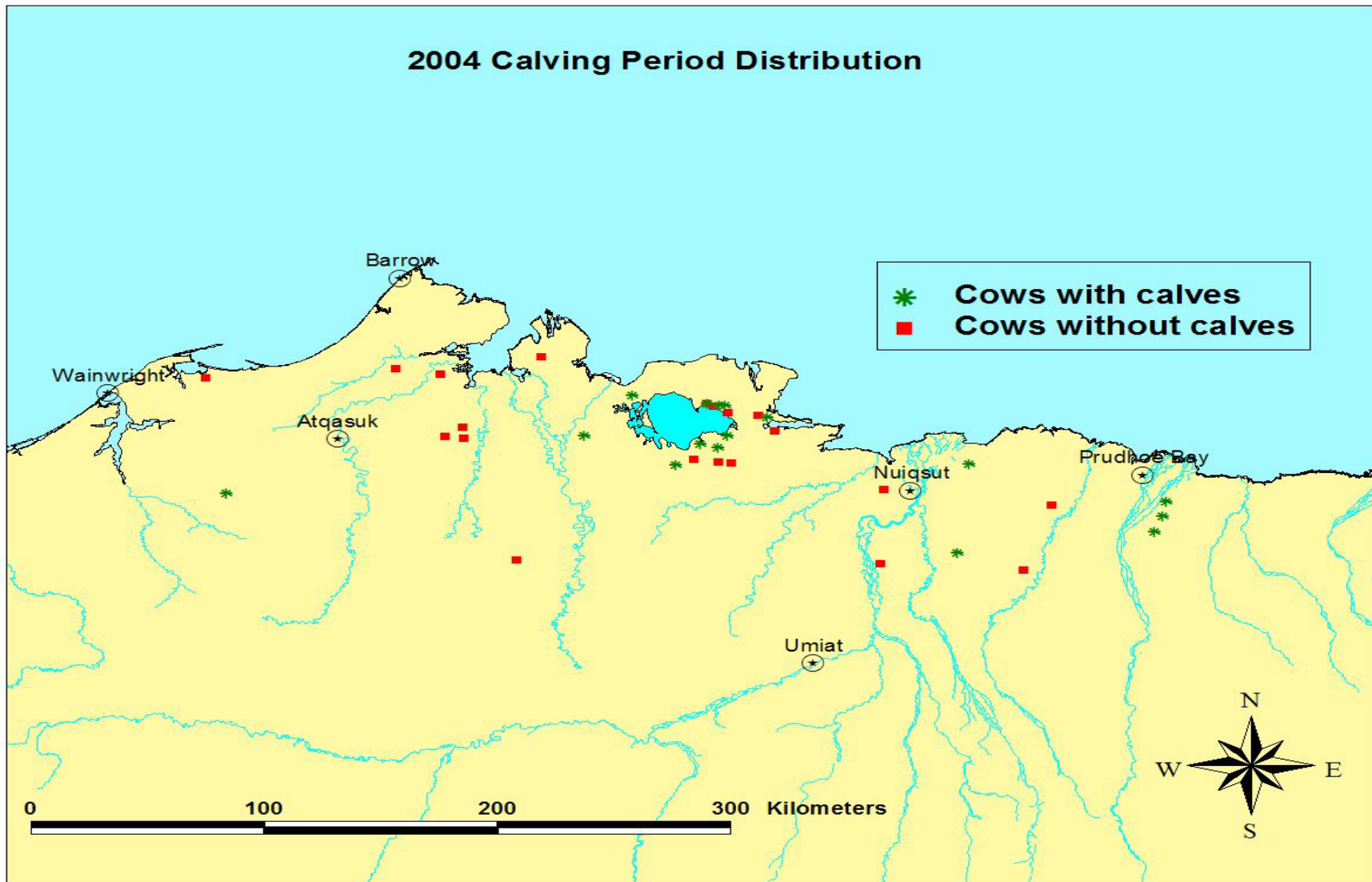


Figure 1 Calving locations of collared TCH cows during 1–16 June 2004. This is the first time collared TCH caribou have been observed calving in the Central Arctic Caribou Herd calving area.



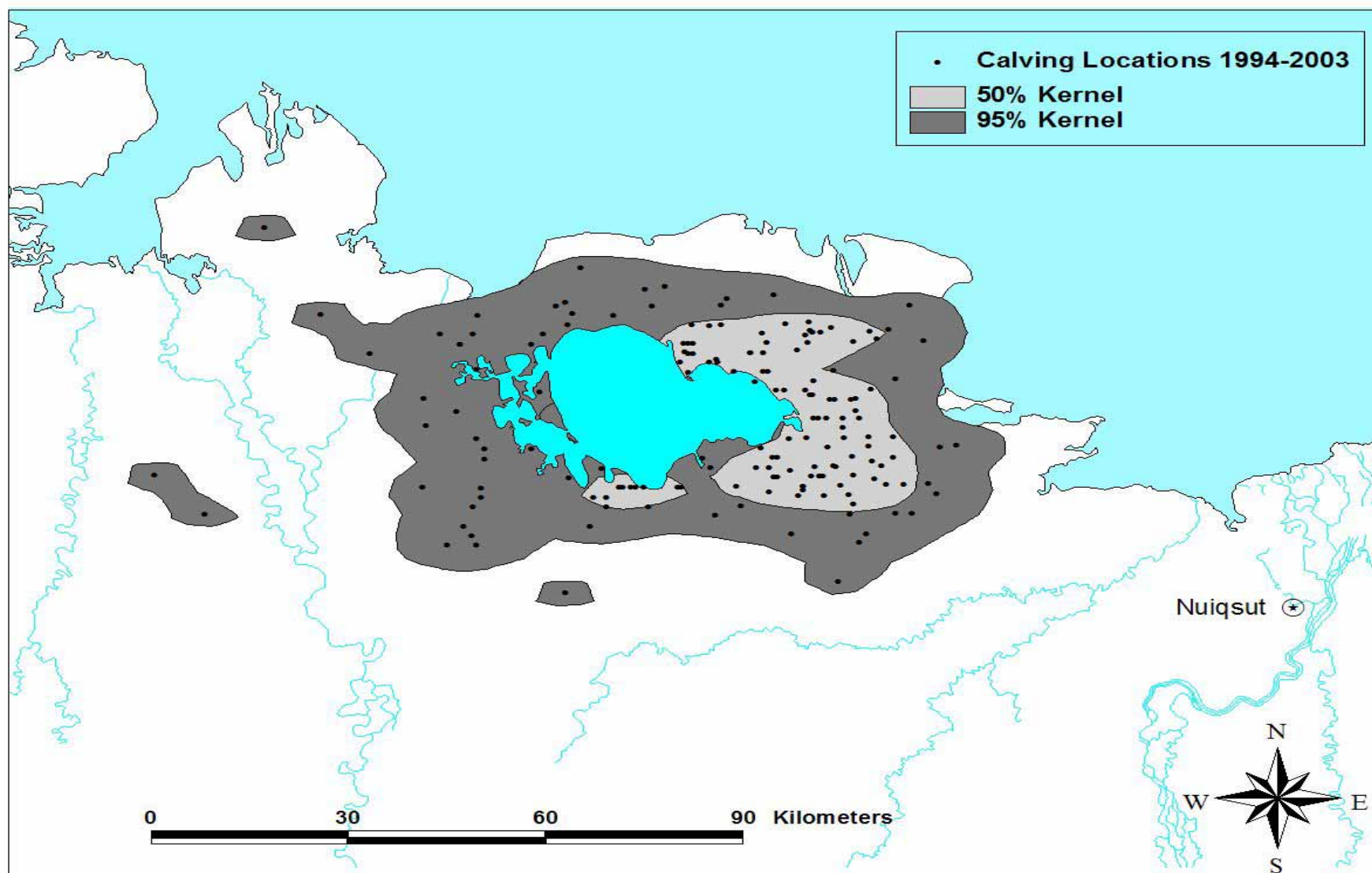


Figure 2 Calving locations of collared TCH cows, 1 June–16 June, 1994–2003, with fixed Kernel Probability of 50% and 95%.

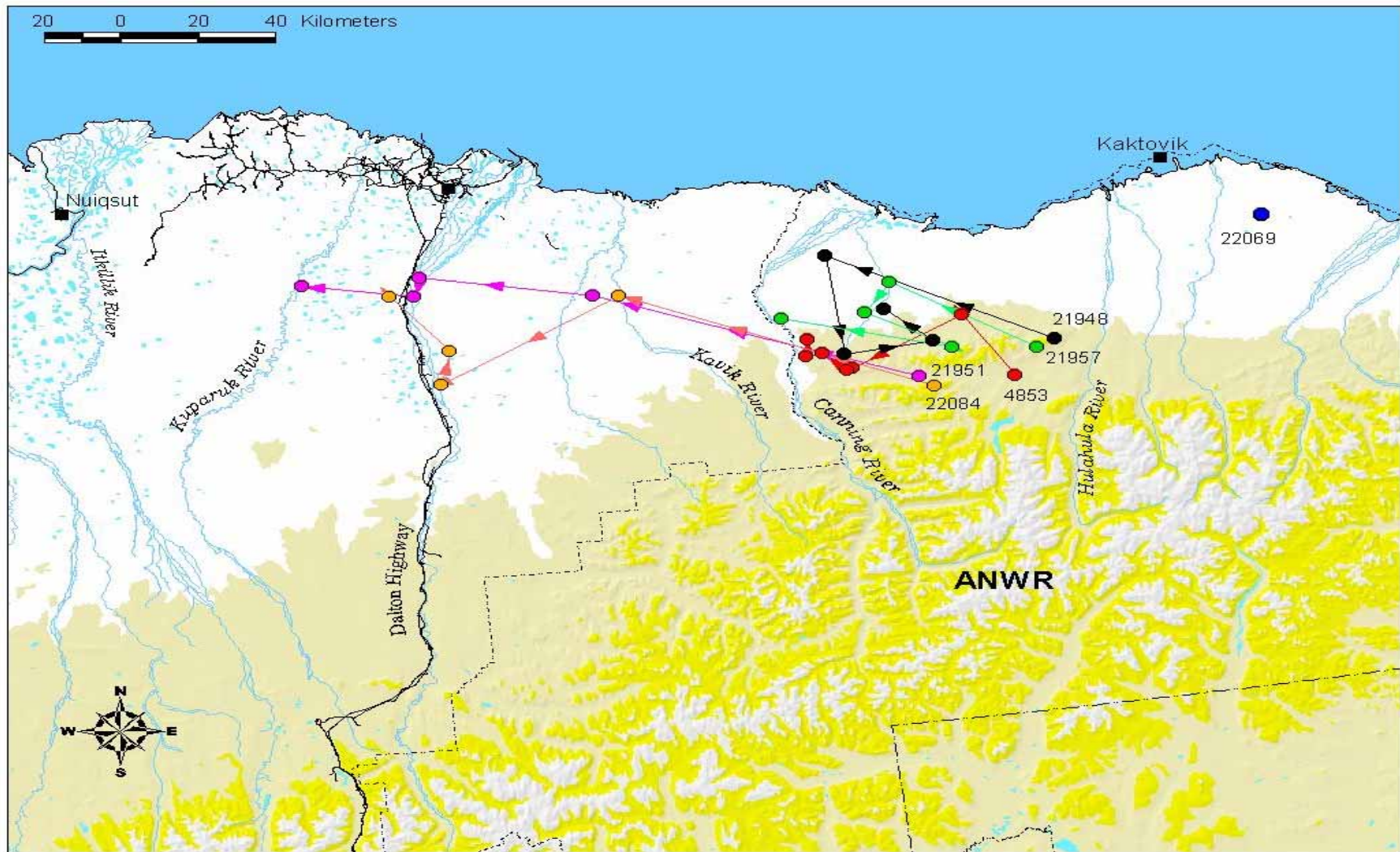


Figure 3 Routes of 2 satellite-collared TCH cows that wintered in ANWR as they traveled west during spring migration. They, along with thousands of other Teshekpuk caribou, were stopped by the trans-Alaska pipeline/Dalton Highway on 19 April 2004 and stayed east of the pipeline until 29 April 2004, when they crossed and continued to the west.

## **CARIBOU MANAGEMENT REPORT**

From: 1 July 2002

To: 30 June 2004<sup>a</sup>

### **LOCATION**

**GAME MANAGEMENT UNITS:** 26B and 26C (25,787 mi<sup>2</sup>)

**HERD:** Central Arctic

**GEOGRAPHIC DESCRIPTION:** Central Arctic Slope and Brooks Range

### **BACKGROUND**

In the mid 1970s, the Central Arctic caribou herd (CAH) was recognized as a discrete herd, and in 1975 it was estimated at 5000 caribou (Cameron and Whitten 1979). By 1983 the CAH increased to approximately 13,000 and by 1992 to more than 23,000 caribou (Valkenburg 1993). In 1995 the herd declined to 18,100 and then stabilized for a few years. By 2000, herd size increased substantially to more than 27,000 animals, and in 2002 the herd was estimated at 31,857 caribou. The recent increase was due to low adult mortality (<10%), high parturition rates (≥85%), and high calf survival to October (≥50 calves:100 cows) during 1998–2002.

Reported harvest on the CAH has changed over time, probably as a result of regulatory modifications and changes in hunting pressure. In regulatory year (RY) 1986 (RY = 1 Jul through 30 Jun, e.g., RY86 = 1 Jul 1986 through 30 Jun 1987), more restrictive regulations were adopted, and harvest decreased substantially through RY90. Beginning in RY91, harvest and hunting pressure increased on the CAH, probably because (1) hunting was severely restricted on several Interior Alaska caribou herds (e.g., Delta, Macomb, Fortymile), which displaced hunters to hunt the CAH, and (2) the CAH was accessible by road because the Dalton Highway was officially open to public traffic in 1991. Reported harvest increased moderately beginning in RY00. Some of this increase was by bowhunters along the Dalton Highway.

The CAH traditionally calved between the Colville and Kuparuk Rivers on the west side of the Sagavanirktok River and between the Sagavanirktok and the Canning Rivers on the east side. During the early 1990s, the greatest concentration of caribou calving in the western portion of Unit 26B shifted southwest as development of infrastructure related to oil production occurred in what was originally a major calving area (Lawhead and Johnson 2000; Wolfe 2000). No directional shift in distribution of caribou calving east of the Sagavanirktok River was noted. The CAH's summer range extends from Fish Creek, just west of the Colville River, eastward along the coast (and inland approximately 30 miles) to the Katakturuk River. The CAH winters in the

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<sup>a</sup> This unit report also includes data collected outside the reporting period at the discretion of the reporting biologist.

northern and southern foothills and mountains of the Brooks Range. The herd's range often overlaps with the Porcupine caribou herd (PCH) on summer and winter range to the east and with the Western Arctic (WAH) and Teshekpuk (TCH) herds on summer and winter range to the west.

Within the range of the CAH, oil exploration and development began in the late 1960s and continues to the present. Beginning in the late 1970s, the Alaska Department of Fish and Game (ADF&G) implemented long-term studies on population dynamics, distribution, movements, and effects of development on the CAH. During the 1980s, calving activity was rare in the Prudhoe Bay oil field where it was known to occur before development (Whitten and Cameron 1985). In addition, cows and newborn calves were underrepresented along the trans-Alaska pipeline corridor and around oil production facilities in the early 1990s (Cameron and Smith 1992; Cameron et al. 1992). By the mid 1980s, major movements of CAH caribou through the Prudhoe Bay oil field in summer had ceased, and caribou distribution and movements within the Kuparuk oil field were altered substantially (Smith and Cameron 1983, 1985*a, b*; Whitten and Cameron 1983, 1985; Curatolo and Murphy 1986). In the mid 1990s research on the Central Arctic herd was reduced substantially, and efforts were focused on monitoring population parameters and their relationship to management objectives. Beginning in 2001, research efforts were renewed to look at the effects of oil field development on production, growth, survival, and movements of caribou calves (Arthur and Del Vecchio 2004).

## **MANAGEMENT DIRECTION**

Some of the CAH management goals and objectives were developed in response to concerns arising from research conducted during 1978–1993. Based on the hypothesis that displacement of sufficient magnitude would be harmful to the CAH (Cameron 1983), we worked with the oil industry to minimize disturbance to caribou movement due to physical barriers created by oil development. In addition, given that stress is cumulative, ADF&G reduced hunting activity in areas adjacent to the oil field and the Dalton Highway and also restricted the cow harvest. The current management objectives reflect these concerns. In addition, during the March 2000 Alaska Board of Game meeting, “Intensive Management” population and harvest objectives were established for the CAH. The population objective is 18,000–20,000 caribou, and the harvest objective is 600–800 caribou (5 AAC 92.108).

### **MANAGEMENT GOALS**

- Goal 1:* Minimize the adverse effects of development on CAH caribou.
- Goal 2:* Maintain a CAH population level that will support a harvest of at least 600 caribou without precluding population growth.
- Goal 3:* Provide the opportunity for a subsistence harvest of CAH caribou.
- Goal 4:* Maintain opportunities to view and photograph CAH caribou.

### **MANAGEMENT OBJECTIVES**

- Objective 1:* Maintain a population of at least 18,000–20,000 caribou. (Goals 1, 2, 3)

- Objective 2:* Maintain accessibility of seasonal ranges for CAH caribou. (Goal 1)
- Objective 3:* Maintain a harvest of at least 600 caribou if the population is  $\geq 18,000$  caribou. (Goal 2)
- Objective 4:* Limit the annual harvest of cows to a maximum of 3% of the cows in the population. (Goals 1, 2, 3)
- Objective 5:* Maintain a ratio of at least 40 bulls:100 cows. (Goals 1, 2, 3)
- Objective 6:* Reduce conflicts between consumptive and nonconsumptive uses of caribou along the Dalton Highway. (Goal 3)

## **MANAGEMENT ACTIVITIES**

- Conduct a photocensus every 2–3 years. (Objective 1)
- Conduct annual fall composition counts. (Objectives 3, 4, 5)
- Radiocollar 10–20 yearling females every 1–2 years. (Objectives 1 and 2)
- Radiotrack during early summer, fall, and winter to determine seasonal distribution. (Objectives 1 and 2)
- Radiotrack and estimate parturition rate and late June calf:cow ratios for radiocollared females. (Objective 1)
- Monitor harvest through harvest ticket reports and Division of Subsistence harvest surveys. (Objectives 3 and 4)
- Work with the oil industry and other agencies to minimize disturbance to caribou from resource development. (Objectives 1 and 2)
- Regulate hunting to maintain a maximum annual harvest rate of 3% of cows in the population. (Objective 4)
- Regulate caribou hunting along the Dalton Highway to reduce conflicts between consumptive and nonconsumptive uses. (Objective 6)

## **METHODS**

### **POPULATION STATUS AND TREND**

#### *Population size*

Population size was estimated in July 1997, 2000, and 2002 using the modified aerial photo-direct count technique (Davis et al. 1979). Postcalving aggregations of caribou were located by radiotracking collared animals. These aggregations usually occurred when temperatures were  $>55^{\circ}\text{F}$  and wind was  $<8$  mph. Groups of caribou were photographed with a Ziess RMK-A

9×9-inch aerial camera mounted in a DeHavilland Beaver aircraft. Caribou were counted directly from photographs.

Parturition and early calf survival (survival to 2 weeks) data were stratified as Unit 26B West (west of the west bank of the Sagavanirktok River) or Unit 26B East (east of the west bank of the Sagavanirktok River) because Cameron (ADF&G, unpublished data) estimated that 80% of CAH cows maintain fidelity to these calving areas from year to year. These 2 calving areas may not be totally separate, but are nonetheless somewhat distinct. Because some overlap does occur, we arbitrarily chose the Sagavanirktok River as the line that separates Unit 26B West, where there is substantial oil exploration and development, from Unit 26B East, where little exploration and development has occurred.

Parturition rate was determined by observing radiocollared females  $\geq 2$  years old from a fixed-wing aircraft during the first half of June. Caribou observed with calves, hard antlers, or distended udders were classified as parturient (Whitten 1991). During 1988–1993, caribou were relocated 2–3 times during 30 May–14 June. During 1995–2002, caribou were located once, and the target date was pre-peak calving between 3 and 9 June. During this period, parturient caribou may have been missed because the cow did not have hard antlers and the udder was not distended, and because calves were born early and died or calves were born late and not observed. Beginning in 2003, caribou were located 2–3 times during 30 May–14 June in corroboration with an ongoing research project (Arthur and Del Vecchio 2004). Data were stratified based on the location of caribou east and west of the Sagavanirktok River, as described above.

The proportion of calves:100 cows was determined by observing radiocollared females  $\geq 2$  years old from a fixed-wing aircraft after most calving should have occurred. If a cow was observed with a calf, she was classified as “with calf.” If distended udders were detected but no calf was seen, we assumed the cow had recently lost a calf and she was classified as “without calf.” During 1988–1994, calves:100 cows were determined from the last half of June through mid August. Since 1994, calves:100 cows has been determined during 15–30 June. This technique provides an indication of early calf survival and is referred to as late June calf:cow ratios. In addition, data were stratified based on the location of caribou east and west of the Sagavanirktok River (as described above) using locations from the current summer. In 2004 only GPS-collared females with radiocollared calves were relocated (in conjunction with an ongoing research project, Arthur and Del Vecchio 2004). We were unable to observe whether a cow was with a calf or not unless both were radiocollared because the caribou were aggregated too tightly.

Parturition rates and the proportion of calves:100 cows were calculated for 2 categories: known-age females and females  $\geq 4$  years old. Beginning in 2004, some random captures of adults were made and classified as “young,” “medium,” and “old” based on tooth wear. Caribou classified as “medium” or “old” were included in the “females  $\geq 4$  years old” category. Data for females  $\geq 4$  years old were stratified based on the location of caribou east and west of the Sagavanirktok River.



### *Population Composition*

No fall composition survey was conducted in 2003 and 2004 due to budget constraints. Fall composition was estimated from a helicopter in mid October 2000, 2001, and 2002. Caribou were classified as cows; calves; and small, medium, or large bulls.

### *Distribution and Movements*

Distribution of the CAH was monitored during calving, postcalving, summer, rut, and winter by relocating radiocollared females during June, July, mid October, and late March or early April.

## **HARVEST**

Harvest and hunting pressure by Alaska residents who lived south of the Yukon River and by nonresidents were monitored using harvest reports submitted by hunters. Total harvest, residency and success, chronology, and transportation were summarized by regulatory year.

Alaska residents who lived north of the Yukon River were not required to obtain caribou harvest tickets/report cards. However, they were required to register with ADF&G or an authorized vendor. ADF&G Division of Subsistence estimated caribou harvested by residents of Kaktovik and Nuiqsut. Caribou harvested by hunters from Nuiqsut included animals from the Teshekpuk and Western Arctic caribou herds, as well as some CAH caribou.

A hunter checkstation was operated on the Dalton Highway near the Yukon River Bridge during August and September 1991, 1992, 1993, 1996, 1997, and 1998. Checkstation reports are on file at ADF&G, Fairbanks.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

#### *Population Size*

Population size was not estimated in 2003 or 2004. However, parturition rates and late June calf:cow ratios were good in all 3 years (see below); thus it is likely that the Central Arctic caribou herd continued to increase from an estimated 31,857 caribou in 2002 or was at least stable during 2003–2004. The July 2002 estimate of 31,857 caribou represented a 17% increase (8.5% annually) from the July 2000 estimate of 27,128 (Table 1). The CAH increased substantially since 1997 when the herd was estimated at 19,730 caribou. Population modeling indicated this increase can be accounted for by the high parturition rates, high early summer calf survival, and low adult mortality observed during this period (Tables 2, 3, and 4).

Parturition rates of radiocollared females  $\geq 4$  years old for all of Unit 26B in 2002, 2003, and 2004 were 87%, 96% and 89%, respectively, and have been high since 1998 ( $\geq 85\%$ ; Table 2). These high parturition rates contributed to the increase in population size observed in the 2000 and 2002 censuses (Tables 1 and 2). Parturition rates for 3-year-olds were high in 2002 (83%) and 2004 (87%), but were not estimated for 2003 because no 3-year-olds were collared. In general, parturition rates for 3-year-olds have been high since 1998 ( $\geq 75\%$ ,  $n = 4\text{--}13$ ; Table 4), when the herd was increasing. (A high parturition rate, particularly in 3-year-olds, is indicative of good nutritional condition, although variability in parturition rates can be relatively high

among 3-year-old cows [Valkenburg et al. 2000].) In 1995, when the population appeared to decline somewhat, no 3-year-old females were pregnant ( $n = 4$ ) and parturition rates for females  $\geq 4$  years old were also low (56%, Tables 1 and 2). We also observed parturition rates between Unit 26B West and Unit 26B East. Parturition rates in 2002, 2003, and 2004 were somewhat higher in Unit 26B East than in Unit 26B West, and we noted that this pattern was consistent during the past 5 years (2000–2004; Table 2).

Late June calf:cow ratios of radiocollared females  $\geq 4$  years old in all of Unit 26B in 2002, 2003, and 2004 were 79%, 77% and 79%, respectively, and have been high since 1997 ( $\geq 75\%$ ; Table 3). This indicated a consistently high early calf survival during the past 8 years, which also contributed to the increase in population size observed in 2000 and 2002. During years when the herd was declining or stable (1994–1996), late June calf:cow ratios were lower ( $< 65\%$ ; Table 3). The late June calf:cow ratio for 3-year-olds in 2002 was 57% and was not estimated in 2003 because no 3-year-olds were collared. In 2004, late June calf:cow ratios were only estimated for GPS-collared cows that had radiocollared calves, of which none were 3 years old. During 1998–2003, variability in calf:cow ratios was higher for 3-year-olds than for the overall sample in the herd (33–60%, Table 5). This suggests that calves born to 3-year-olds tend to have lower survival rates, although our sample sizes were small ( $n = 4$ –12). We also observed calf:cow ratios between Unit 26B West and Unit 26B East. Similar to differences observed with parturition rates, late June calf:cow ratios in 2002, 2003, and 2004 were higher in Unit 26B East than in Unit 26B West. This pattern was consistent during the past 5 years (2000–2004; Table 3).

Although our analyses used the Sagavanirktok River to separate Unit 26B West and Unit 26B East, there are several reasons to view this approach and the results with caution. Even though density of calving caribou is lower near the Sagavanirktok River than in areas farther east or west, there is not a complete separation between calving concentrations, and there may be no biological reason to separate caribou based on calving areas. Also, this may not be the best dividing line if calving distribution changes. Furthermore, we may not be able to detect differences between areas because of small sample sizes in some years.

### *Population Composition*

No fall composition surveys were conducted in 2003 or 2004. The fall composition survey in October 2002 indicated a bull:cow ratio of 67:100 and a calf:cow ratio of 72:100 (Table 6). Bull:cow ratios have been high since 1976 ( $> 50:100$ ). These high bull:cow ratios indicate that harvest has had little effect on sex ratios. Calf:cow ratios were high in 2000, 2001, and 2002 ( $> 50:100$ ), indicating that summer calf survival rates were relatively high. The composition surveys occurred in the Brooks Range in the Chandalar Shelf, Atigun Pass, Galbraith Lake, and upper Sagavanirktok River areas.

### *Distribution and Movements*

Distribution of calving during 2002, 2003, and 2004 was similar among years and similar to years previous to 2002, except in 2001 when snowmelt and calving occurred later in June (Lenart 2003; Arthur and Del Vecchio 2004). During 2002–2004 the greatest concentration of calving in Unit 26B West occurred between the Conoco–Philips Alaska Meltwater production pad and the Kuparuk River, south of the spine road. In Unit 26B East the greatest concentration



of caribou calving occurred between the Shaviovik and Canning Rivers in 2002, between the Sagavanirktok and Shaviovik with another concentration between the Shaviovik and Canning Rivers in 2003, and between the Sagavanirktok and the Shaviovik Rivers in 2004 (Arthur and Del Vecchio 2004).

Movements in summer (postcalving) are influenced by insect abundance, which largely depends on temperature and wind speed (Dau 1986). Generally, when temperature is  $>55^{\circ}\text{F}$  and wind speed is  $<8$  mph, caribou are found along the coast or on large gravel bars. Caribou were concentrated along the coast during warm weather but moved inland on cool and windy days. No unusual summer movements were noted in 2002 and 2003. In July 2004 most of the GPS radiocollared caribou that had calved in Unit 26B West moved into Unit 26B East. CAH caribou were found as far east as the Hulahula River (S. Arthur, ADF&G, personal communication; ADF&G files). Other unusual movements have also been noted in the past. In late July 2001 an estimated 5000 Central Arctic caribou were found inland in the Fish Creek drainage in Unit 26A. Commonly, though, the CAH summer range extends from the Colville River to just east of the Canning River and from the coast inland to the foothills. The CAH begins migrating toward the foothills of the Brooks Range during August, and by September most caribou are found along the foothills of the Brooks Range, particularly around Toolik Lake, Galbraith Lake, Accomplishment Creek, the Ivishak River, and the upper Sagavanirktok River. When unusually warm temperatures persist in September, the CAH will sometimes remain on the coastal plain as far north as the White Hills and Franklin Bluffs until about mid October. In 2002, caribou persisted on the coastal plain through August and the first week of September because of warm weather. By mid September, most of the caribou were headed for the foothills of the Brooks Range. In 2003 no unusual movements were detected during September. However, the Teshekpuk caribou herd made a very unprecedented movement from Teshekpuk Lake area across the coastal plain in Unit 26B, continuing east into the Arctic National Wildlife Refuge (ANWR) and to Barter Island, spending the winter in that region. In 2004 the CAH caribou that had moved east during July 2004 migrated back in early September. Many crossed the Brooks Range and continued eastward and southward to the Coleen River.

During the rut in October, large concentrations of caribou can be found on Chandalar Shelf in Your and Thru Creeks and the North Fork and Middle Fork Chandalar River on the south side of the Brooks Range. On the north side of the Brooks Range, caribou can be located around Galbraith Lake, Accomplishment Creek, and in the upper Sagavanirktok River. In 2002 and 2003 no unusual movements were detected during the rut in October. In 2004 the caribou that had moved east to the Coleen River in September returned to their traditional rutting grounds in the Middle Fork Chandalar River by mid October.

In RY02 and RY03, approximately 80% of the herd wintered on the south side of the Brooks Range between the North Fork Chandalar and Wind Rivers. In RY04, approximately 60% of the herd wintered on the south side of the Brooks Range between the North Fork Chandalar and Wind Rivers, with another large concentration wintering farther east, just south of Arctic Village.

The caribou that wintered on the north side in RY02 and RY03 were found on the east side of the Dalton Highway, along the foothills in the Upper Sagavanirktok, Accomplishment Creek, and

Lupine drainages; some caribou were as far east as the Canning River. Almost all of the radiocollared caribou were located east of the Dalton Highway. Additionally, in RY02, many caribou were distributed across the coastal plain, west of the Dalton Highway, and approximately 2500–3500 caribou wintered along the Kuparuk River. We suspected that the caribou west of the Dalton Highway were a mixture of Teshekpuk, Western Arctic, and Central Arctic caribou, as some radio collars from each herd were found there. Winter distribution of the CAH during 2002–2004 was somewhat similar to what was observed during the late 1990s, except that it appears they are expanding their winter range. During the mid 1990s, many Central Arctic caribou wintered in the Chandalar Shelf area and east into the Wind River drainage, and in the Tinyaguk and upper North Fork Koyukuk Rivers (ADF&G files). March 2003 experienced heavy snows on the south side of the Brooks Range, and it appeared that the spring migration north was delayed.

Mixing with the Teshekpuk caribou herd frequently occurs in both summer and winter because both herds' ranges overlap along the Colville River. As mentioned previously, we suspected that during winter RY02, extensive overlap among the Teshekpuk, Central Arctic, and Western Arctic herds occurred along the Kuparuk River. In RY03 some mixing occurred when the TCH traveled to ANWR to winter. On their return spring migration, 3 Teshekpuk satellite collars remained in the CAH calving grounds during June and July. It is likely that several thousand caribou remained with them (Carroll 2005).

Some mixing with the Western Arctic herd may have occurred during winter 2003–2004 when approximately one-third of the Western Arctic caribou herd wintered on the south side of the Brooks Range, west of the Dalton Highway in Gates of the Arctic National Park and Preserve (J. Dau, ADF&G, personal communication; ADF&G files). This phenomenon did not repeat itself in winter 2004–2005. During the early 1990s, we suspected some mixing with the WAH occurred during September on the north side of the Brooks Range when large groups of caribou (>5000) were observed.

It is unlikely that any mixing with the PCH occurred during summers 2002–2004. In RY03 a large concentration of PCH caribou wintered near Arctic Village, and some overlap with the CAH probably occurred. Indeed, one GPS radiocollared CAH caribou followed the PCH eastward during its spring migration in March. She remained with the PCH during summer 2004, wintered with the PCH in RY04, had a calf on the PCH calving grounds in June 2005 and died shortly after calving. In 2001 some mixing may have occurred during the summer when approximately 10,000 Porcupine caribou inhabited the Sadlerochit Mountains, and Central Arctic caribou were located near the Canning River, 10–20 miles away. In addition, in winter 2001 we detected a small amount of overlap in CAH and PCH distribution when approximately half of the PCH was thought to have wintered in Alaska near Arctic Village. One Central Arctic radiocollared caribou was found on the Junjik River near some collared PCH caribou, and a hunter killed a Central Arctic radiocollared female near Arctic Village in January 2002. Additionally, one collared PCH caribou was found on the Ribdon River near some CAH animals.

## MORTALITY

### *Harvest*

Most harvest occurred in Unit 26B, but some also occurred in Units 24, 25A, 26A and 26C. However, harvest in units other than Unit 26B and 26C (in summer and early fall) was recorded as harvest for a different herd (e.g., PCH). In addition, parts of the Western Arctic herd occasionally mixed with the CAH in fall and winter, and some of these animals may have been harvested and recorded as harvest from the CAH.

### Season and Bag Limit (RY96–RY04).

Unit/Location	Resident Open Season/Bag Limit	Nonresident Open Season/Bag Limit
Unit 25A	1 Jul–30 Apr; 10 caribou	1 Jul–30 Apr; 5 caribou
Unit 26B, within the Dalton Highway Corridor Management Area	1 Jul–30 Apr; 2 caribou; however, only 1 caribou may be taken 1 Jul–30 Sep, and cow caribou may be taken only 1 Oct–30 Apr	1 Jul–30 Apr; 2 bulls; however, only 1 bull may be taken 1 Jul–30 Sep
Unit 26B, that portion north of 69°30' and west of the east bank of the Kuparuk River to a point at 70°10'N latitude 149°04'W longitude, then west approximately 22 miles to 70°10' latitude 149°56'W longitude, then following the east bank of the Kalubik River to the Arctic Ocean	1 Jul–30 Apr; 10 caribou	1 Jul–30 Apr; 5 caribou
Remainder of Unit 26B	1 Jul–30 Apr; 2 caribou; however, only bulls may be taken 1 Jul–30 Sep, and cow caribou may be taken only 1 Oct–30 Apr	1 Jul–30 Apr; 2 bulls
Unit 26C	1 Jul–30 Apr; 10 caribou; however, only bull caribou may be taken 23–30 Jun	1 Jul–30 Apr; 5 caribou

Additional state regulations that affect caribou hunting include special restrictions along the Dalton Highway. The Dalton Highway Corridor Management Area (DHCMA) extends 5 miles from each side of the Dalton Highway from the Yukon River to the Prudhoe Bay Closed Area, which encompasses most of the Prudhoe Bay oil field. The DHCMA is closed to hunting with

firearms. Big game, small game, and fur animals can be taken by bow and arrow only, but hunters must possess a valid Alaska Bowhunter Education Program card or a recognized equivalent certification. In addition, no motorized vehicles except aircraft, boats, and licensed highway vehicles may be used to transport game or hunters within the DHCMA.

Federal subsistence hunting regulations also apply on federal lands within the DHCMA. Beginning in RY92, federal regulations allowed the use of firearms for hunting on federal land within the DHCMA by qualified rural subsistence hunters. During the first year of the regulation, qualified hunters included any rural resident. Subsequently, qualified hunters included residents of the corridor and the nearby villages of Anaktuvuk Pass, Wiseman, Nuiqsut, and Kaktovik.

Alaska Board of Game Actions and Emergency Orders. During the March 2004 meeting, the Board of Game rescinded several of the regulations related to bow hunting along the Dalton highway that were put into effect in RY02. The North Slope Closed Area was eliminated, along with the requirement that hunters mark their arrows. In addition, limiting the use of licensed highway vehicles in the DHCMA to publicly maintained roads was more clearly defined to allow no motorized vehicles, except licensed highway vehicles on the following designated roads: 1) Dalton Highway; 2) Bettles Winter Trail during periods when BLM and the City of Bettles announce that the trail is open to winter travel; 3) Galbraith Lake road from the Dalton Highway to the BLM campground at Galbraith Lake, including the gravel pit access road when it is open; 4) Toolik Lake road, excluding the driveway to Toolik Lake Research Facility; 5) Sagavanirktok River access road 2 miles north of Pump Station 2; and 6) any constructed roadway or gravel pit within ¼ mile of the Dalton Highway. The 2002 regulation that extended the restriction on the use of motorized vehicles in the DHCMA to apply to the Prudhoe Bay Closed Area remained in regulation for RY04. Caribou seasons and bag limits have remained the same since 1996.

Hunter Harvest and Success and Residency. During RY02, 877 hunters reported hunting caribou in the CAH range and 358 hunters reported harvesting 423 caribou. In RY03, 741 hunters reported hunting and 355 hunters reported harvesting 419 caribou. In RY04, 965 hunters reported hunting and 501 hunters reported harvesting 613 caribou. Reported harvest was considerably higher beginning in RY00 (Table 7). Number of hunters and harvest increased again in RY04, which may be related to caribou distribution and accessibility.

Hunter success has always been good for the Central Arctic Herd ( $\geq 40\%$  and frequently  $\geq 50\%$ ; Table 7). Beginning in RY98 reminder letters were sent out to hunters to remind them to send in their report cards. This likely prompted unsuccessful hunters to turn in their report cards; thus, the reported success rate after RY97 probably more closely reflects the actual success rates compared to years before RY97.

A small proportion of hunters were nonresidents (20%, 21%, and 21%) during RY02–RY04, and they took 26%, 25%, and 22% of the harvest, similar to previous years. Nonresident hunters were highly successful (58%, 63%, and 60%, respectively). Nonlocal resident hunters during the same period also had good success (41%, 49%, and 56%). Harvest by local residents (residents of Units 24, 25, 26; particularly Nuiqsut and Kaktovik residents) was estimated at 200–250 caribou annually. However, it is difficult to accurately assess harvest of CAH animals by some local residents, especially in the Nuiqsut area, because the Teshekpuk and Western Arctic herds frequently mix with the Central Arctic herd during periods when much of the harvest occurs.

Reported harvest of cows was low during RY02–RY04 (12–38), similar to previous years (Table 7). The harvest of cows by local residents was estimated at 22% of the estimated total harvest of 200–250 caribou. This was based on several years of data (1985, 1992, 1993, 1994, 1999) from the Nuiqsut Subsistence Caribou Harvest Surveys, a cooperative effort of the City of Nuiqsut, Kuukpik Corporation, Native Village of Nuiqsut, North Slope Borough, and ADF&G Division of Subsistence (ADF&G files).

Bowhunters accounted for 23%, 33%, and 36% of the harvest in RY02, RY03, and RY04, respectively. The lower value in 2002 was probably related to distribution of caribou. In general, there has been a steady increase in the number of bowhunters using the DHCMA.

Harvest Chronology. During RY02–RY04, most reported harvest occurred in August (43–59%), similar to previous years (Table 8). The remaining harvest occurred primarily in September and then in October. In RY01 a substantial increase in the proportion of harvest occurred in October (25%). This was likely related to warmer weather persisting into October in fall 2001. A small number of caribou were taken in late winter and spring, primarily in March and April (1–5%).

Harvest by Nuiqsut residents occurs in July, August, and September and in March and April. A little over 50% of the harvest occurs in summer and fall. When unusually cold weather persists and spring arrives late, caribou are harvested in May (S. Pedersen, ADF&G, personal communication).

Transport Methods. Because of restrictions on the use of off-road vehicles within the DHCMA and the remoteness of Unit 26B, most hunters used highway vehicles and aircraft for access. During RY02–RY04, the proportion of hunters who used highway vehicles ranged from 50 to 53%. This value was slightly lower than years previous to 2000; it ranged 57–70% during RY92–RY01. This is probably related to an increase in the use of boats in the Ivishak and Echooka drainages. During RY02–RY04, the proportion of hunters who used boats increased to 16–28% compared with a range of 5–15% during RY92–RY01. This transport method competed with airplanes as the second most common transport method for successful hunters during RY02–RY04 (Table 9). Few hunters used horses, dogs, snowmachines, or ATVs as a transport method (Table 9). Residents of Unit 26 used boats during summer and fall and snowmachines during the spring months. Nuiqsut residents primarily hunted from the Colville River and Fish Creek in Unit 26A during summer, and Kaktovik residents hunted along the coast to Camden Bay (S. Pedersen, ADF&G, personal communication; ADF&G files).

### *Natural Mortality*

Radiocollared caribou were relocated infrequently in fall and winter, making it difficult to estimate adult mortality or determine causes of adult mortality. Wolves, grizzly bears, and golden eagles are the 3 most common predators on Arctic caribou (Whitten et al. 1992). However, natural mortality of CAH caribou during calving and postcalving is relatively low because calving occurs in areas near the coast where there are few wolves, and predation by golden eagles appears to be rare compared to the Porcupine caribou herd (Murphy and Lawhead 2000). Grizzly bear numbers may have increased in the oil field, in part because of the availability of garbage associated with oil development (Murphy and Lawhead 2000), and predation by grizzly bears may have increased in recent years. Winter mortality was probably

higher during the 1990s than in previous years because more CAH caribou wintered on the south side of the Brooks Range, where wolves are probably more abundant than on the north side of the range and where snowfall is heavier. However, there have been no studies of predation rates on the CAH. During the 8 years from RY97 to RY04, we confirmed the following mortalities among cow caribou  $\geq 1$  year old with functioning radio collars:

Regulatory year	Number of mortalities	Number of radiocollars located	% Mortality
1997–1998	2	44	4
1998–1999	2	53	4
1999–2000	7	53	13
2000–2001	12	66	18
2001–2002	4	64	6
2002–2003	11	76	14
2003–2004	4	65	6
2004–2005	16	94	17

## CONCLUSIONS AND RECOMMENDATIONS

High parturition rates, high late June calf:cow ratios, and low adult mortality during 1998–2002 contributed to an increase of approximately 61.5% in the Central Arctic caribou herd in 5 years (Tables 1, 2, and 3). Although we have not conducted a population estimate survey since 2002, the CAH experienced high parturition rates and late June calf:cow ratios in 2003 and 2004 and low adult mortality in RY03. This suggests that herd size probably increased or at least remained stable. Harvest increased beginning in RY00 but has remained well below sustained yield (<2% of the herd). Most hunters who lived outside of Unit 26 primarily used highway vehicles as a means of access, and most harvest occurred in August. However, the use of boats in the Ivishak and Echooka drainages has increased substantially in recent years. Harvest by bowhunters also increased in recent years. Hunters who resided in Unit 26 used boats to harvest approximately half of their caribou in July, August, and September and used snowmachines in March and April to take the other half of the caribou they harvested. Although herd size has increased and harvest remained somewhat stable, with an increase beginning in RY00, the CAH has provided substantial hunting opportunity, and we recommend no regulatory changes.

We met our first goal—to minimize adverse effects of development on caribou—by working with Conoco–Phillips Alaska, Inc. in developing mitigation measures. We met our second goal—to maintain a population level that will support a harvest of at least 600 caribou without precluding population growth—because the herd is growing and harvest exceeds 600. We met our third goal—maintaining an opportunity for a subsistence harvest—by providing liberal hunting seasons. We met our fourth goal—to maintain viewing and photographing opportunities—because these opportunities were adequate when taking into account the unpredictability of caribou movements.

Our first and third objectives—to maintain a population of at least 18,000–20,000 caribou and a harvest of at least 600 caribou if the population is  $\geq 18,000$  caribou—was met because in 2002

population size was 31,857 caribou and in both RY02 and RY03, reported and estimated harvest combined exceeded 600 caribou. We also met our fourth objective—of limiting the annual harvest of cows to a maximum of 3% of the cows in the population—because cow harvest has been <1% since RY92. This was partially accomplished by maintaining a bulls-only season during the time of year when hunting pressure is highest. We met our fifth objective—to maintain a ratio of at least 40 bulls:100 cows—because the ratio has been high since RY92 (>60 bulls:100 cows), and although we have not conducted a fall composition survey since 2002, we suspect that the bull:cow ratio is still at least 40 bulls:100 cows. We met our second objective—to maintain accessibility of seasonal ranges for CAH caribou—because, based on radiotelemetry and anecdotal observations, CAH animals were able to access their calving, postcalving, summer, fall, and winter ranges. We met our sixth objective—to reduce conflicts between consumptive and nonconsumptive uses of caribou along the Dalton Highway in 2002—because the board established the North Slope Closed Area, which was closed to big game hunting for ¼ mile on either side of the highway in Unit 26B. However, in 2004 the board rescinded this regulation. Few conflicts between consumptive and nonconsumptive appeared to have arisen since the regulation was rescinded.

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**PREPARED BY:**

Elizabeth A. Lenart  
Wildlife Biologist II

**SUBMITTED BY:**

Doreen I. Parker McNeill  
Assistant Management Coordinator

**REVIEWED BY:**

Mark A. Keech  
Wildlife Biologist III

Laura A. McCarthy  
Publications Technician II

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TABLE 1 Central Arctic herd estimated population size, 1978–2002

Population survey			
Year	Date	Method <sup>a</sup>	Estimated size
1978	Jul	STS	5000
1981	Jul	AC	8537
1983	Jul	APDCE	12,905
1991	18–20 Jun	GM	19,046 <sup>b</sup>
1992	8–9 Jul	APDC	23,444
1995	13 Jul	APDC	18,100
1997	19–20 Jul	APDC	19,730
2000	21 Jul	APDC	27,128
2002	16 Jul	APDC	31,857

<sup>a</sup> STS = Systematic transect surveys; AC = Aerial count; APDCE = Aerial Photo Direct Count Extrapolation; GM = Gasaway Method; APDC = Aerial Photo Direct Count.

<sup>b</sup> Ninety-percent confidence interval was 14,677–23,414.

TABLE 2 Central Arctic herd caribou percent parturition of radiocollared females, 1994–2004

Year	Date	Percent parturition by subunit		
		$\geq 4$ years old <sup>a</sup>		
		26B West ( <i>n</i> )	26B East ( <i>n</i> )	All 26B ( <i>n</i> )
1994	10–14 Jun	67 (6)	78 (9)	73 (15)
1995	7–8 Jun	75 (4)	40 (5)	56 (9)
1996 <sup>b</sup>				
1997	6–7 Jun	77 (13)	46 (13)	61 (26)
1998	3–4 Jun	93 (14)	90 (10)	92 (24)
1999	5, 9 Jun	100 (14)	100 (10)	100 (24)
2000	6–7 Jun	89 (9)	100 (16)	96 (25)
2001	3–9 Jun	89 (19)	94 (16)	91 (35)
2002	4–7 Jun	83 (29)	92 (25)	87 (54)
2003	30 May–8 Jun	93 (28)	100 (26)	96 (54)
2004	31 May–11 Jun	86 (36)	93 (28)	89 (64)

<sup>a</sup> Data for females  $\geq 4$  years old were stratified based on the location of caribou east and west of the Sagavanirktok River. Beginning in 2004, we captured unknown age adult females that were classified as “young,” “medium,” and “old.” Females that were in the “medium” and “old” categories were included in the  $\geq 4$  years old sample.

<sup>b</sup> Survey not completed.

TABLE 3 Central Arctic herd caribou late June calf cow ratios (calves:100 cows) of radiocollared females  $\geq 4$  years old, 1994–2004

Year	Date	Late June calf cow ratios (calves:100 cows) by subunit		
		$\geq 4$ years old <sup>a</sup>		
		26B West ( <i>n</i> )	26B East ( <i>n</i> )	All 26B ( <i>n</i> )
1994	27–29 Jun	50 (6)	75 (8)	64 (14)
1995	27, 30 Jun	75 (4)	50 (4)	63 (8)
1996	15–16 Jun	50 (4)	75 (4)	63 (8)
1997	29–30 Jun	85 (13)	64 (11)	75 (24)
1998	29–30 Jun	79 (14)	85 (13)	81 (27)
1999	22–24 Jun	92 (12)	80 (10)	86 (22)
2000	17–19 Jun	79 (14)	72 (18)	75 (32)
2001	23–25 Jun	78 (18)	81 (16)	79 (34)
2002	23–25 Jun	75 (28)	83 (24)	79 (52)
2003	24–26 Jun	78 (27)	77 (26)	77 (53)
2004 <sup>b</sup>	24 Jun	72 (25)	86 (14)	79 (39)

<sup>a</sup> Data for females  $\geq 4$  years old were stratified based on the location of caribou east and west of the Sagavanirktok River. Beginning in 2004, we captured unknown age adult females that were classified as “young,” “medium,” and “old.” Females that were in the “medium” and “old” categories were included in the  $\geq 4$  years old sample.

<sup>b</sup> Only GPS collared females with radiocollared calves were relocated because the caribou were aggregated tightly, making identifying a calf with the correct cow impossible.

TABLE 4 Central Arctic herd caribou known-age percent parturition of radiocollared females, 1994–2004

Year	Date	2-year-olds ( <i>n</i> )	3-year-olds ( <i>n</i> )	4-year-olds ( <i>n</i> )	5-year-olds ( <i>n</i> )	≥6-year-olds ( <i>n</i> )
1994	10–14 Jun	0 (5)				73 (15)
1995	7–8 Jun	0 (8)	0 (4)			56 (9)
1996						
1997	6–7 Jun	0 (2)	0 (2)	29 (7)	100 (2)	67 (3)
1998	3–4 Jun	0 (6)	75 (4)	0 (1)	88 (8)	100 (3)
1999	5, 9 Jun	9 (11)	82 (11)	100 (2)	100 (1)	100 (17)
2000	6–7 Jun	0 (8)	80 (10)	100 (9)		94 (16)
2001	3–8 Jun	8 (13)	77 (13)	100 (10)	78 (9)	94 (16)
2002	4–7 Jun		83 (12)	75 (12)	100 (9)	100 (20)
2003	30 May–8 Jun	0 (8)		100 (12)	83 (12)	100 (24)
2004	31 May–11 Jun	0 (6)	83 (12)		83 (12)	93 (27)

TABLE 5 Central Arctic herd caribou known-age late June calf:cow ratios (calves:100 cows) of radiocollared females, 1994–2004

Year	Date	2-year-olds ( <i>n</i> )	3-year-olds ( <i>n</i> )	4-year-olds ( <i>n</i> )	5-year-olds ( <i>n</i> )	≥ 6-year-olds ( <i>n</i> )
1994	27–29 Jun	0 (4)				64 (14)
1995	27–30 Jun	0 (6)	0 (3)			62 (8)
1996	15–16 Jun		71 (7)	50 (4)		83 (6)
1997	29 Jun		0 (1)	57 (7)	100 (3)	100 (3)
1998	29–30 Jun	<1 (7)	50 (4)	0 (1)	86 (7)	100 (5)
1999	22–24 Jun	<1 (11)	40 (10)	100 (2)	100 (1)	80 (15)
2000	17–18 Jun	0 (11)	60 (10)	82 (11)	0 (1)	75 (20)
2001	23–25 Jun	0 (3)	33 (12)	70 (10)	89 (9)	81 (16)
2002	23–25 Jun		57 (14)	75 (12)	100 (11)	81 (21)
2003	24–26 Jun			100 (12)	50 (12)	78 (23)
2004 <sup>a</sup>	24 Jun				50 (2)	81 (16)

<sup>a</sup> Only GPS collared females with radiocollared calves were relocated because the caribou were aggregated tightly, making identifying a calf with the correct cow impossible.

TABLE 6 Central Arctic caribou herd fall composition counts, 1976–2002

Survey date	Bulls:100 cows	Calves:100 cows	Percent calves	Percent cows	Percent small bulls (% bulls)	Percent medium bulls (% bulls)	Percent large bulls (% bulls)	Percent bulls	Composition sample size
Oct 1976	122	44	17	38				46	1223
Oct 1977	118	55	20	37				43	628
Oct 1978	96	58	23	39				38	816
Oct 1980	132	49	18	35				47	1722
Oct 1981	81	64	26	41	22	41	36	33	1712
16–18 Oct 1992	96	47	19	41	37	27	40	40	2469
22 Oct 1996	61	67	29	44	15	43	43	27	3062
12 Oct 2000	84	57	24	42	45	40	14	35	3335
13 Oct 2001	73	54	24	44	38	39	23	32	4092
24 Oct 2002 <sup>a</sup>	67	72	30	42	36	43	21	28	1732

<sup>a</sup> This survey was conducted later in the fall than usual, and caribou were more widely distributed; thus, we were unable to obtain a large sample size.

TABLE 7 Central Arctic caribou herd harvest and hunter success, regulatory years 1992–1993 through 2004–2005

Regulatory year	Reported harvest				Total hunters	Percent successful hunters <sup>b</sup>	Estimated unreported harvest <sup>c</sup>	Total harvest
	Male	Female	Unk	Total (harvest by bow) <sup>a</sup>				
1992–1993	391	32	4	427 (93)	655	58	100–200	527–627
1993–1994	347	23	2	372 (90)	618	54	100–200	472–572
1994–1995	320	20	0	340 (103)	584	54	100–200	440–540
1995–1996	318	18	0	336 (79)	571	53	100–200	436–536
1996–1997	200	18	3	221 (77)	384	49	200–250	421–471
1997–1998	289	18	2	309 (96)	500	54	200–250	509–559
1998–1999	292	18	5	315 (87)	699	40	200–250	515–565
1999–2000	343	17	2	362 (136)	722	43	200–250	562–612
2000–2001	464	28	1	493 (215)	808	51	200–250	693–743
2001–2002	495	16	4	515 (192)	918	47	200–250	715–765
2002–2003	397	23	3	423 (98)	877	41	200–250	623–673
2003–2004	403	12	4	419 (139)	741	48	200–250	619–669
2004–2005	571	38	4	613 (221)	965	52	200–250	813–863

<sup>a</sup> Harvest by bow is also included in total harvest.

<sup>b</sup> Percent successful hunters calculated by dividing total reported harvest by number of successful hunters.

<sup>c</sup> Estimated by area biologist and Division of Subsistence.



TABLE 8 Central Arctic caribou herd harvest chronology, regulatory years 1992–1993 through 2004–2005<sup>a</sup>

Regulatory year	Month (%)										Unk <sup>b</sup>	Total
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr		
1992–1993	7 (2)	197 (46)	122 (29)	73 (17)	10 (2)	1 (<1)	1 (<1)	0 (0)	6 (1)	6 (1)	3	427
1993–1994	34 (9)	152 (41)	73 (20)	78 (21)	14 (3)	1 (<1)	2 (<2)	4 (<1)	3 (1)	8 (2)	3	372
1994–1995	28 (8)	154 (45)	109 (32)	27 (8)	1	0 (0)	0 (0)	0 (0)	12 (3)	6 (2)	3	340
1995–1996	9 (3)	150 (45)	64 (19)	65 (19)	21 (6)	1 (<1)	4 (<1)	1 (<1)	9 (3)	8 (2)	4	336
1996–1997	13 (6)	108 (49)	49 (22)	35 (16)	1	0 (0)	2 (<1)	0 (0)	2 (1)	5 (2)	5	220
1997–1998	7 (2)	189 (61)	40 (13)	44 (14)	1	3 (<1)	0 (0)	0 (0)	7 (2)	14 (4)	4	309
1998–1999	18 (6)	163 (52)	59 (19)	47 (15)	5 (2)	2 (<1)	3 (<1)	2 (<1)	3 (1)	9 (3)	4	315
1999–2000	18 (5)	201 (55)	86 (24)	16 (5)	8 (2)	1 (<1)	1 (<1)	0 (0)	8 (2)	17 (5)	4	362
2000–2001	42 (8)	262 (53)	109 (22)	32 (6)	11 (2)	0 (0)	2 (<1)	3 (<1)	4 (1)	24 (5)	4	493
2001–2002	28 (5)	217 (42)	117 (23)	127 (25)	7 (1)	0 (0)	0 (0)	2 (<1)	5 (1)	7 (1)	5	515
2002–2003	24 (6)	184 (43)	131 (31)	44 (10)	8 (2)	1 (<1)	1 (<1)	1 (<1)	4 (1)	21 (5)	4	423
2003–2004	17 (4)	228 (54)	122 (29)	24 (6)	3 (<1)	0 (0)	2 (<1)	2 (<1)	1 (<1)	12 (3)	8	419
2004–2005	21 (3)	363 (59)	113 (18)	73 (12)	6 (1)	1 (<1)	0 (0)	0 (0)	17 (3)	16 (3)	3	613

<sup>a</sup> Includes only harvest from harvest report cards.<sup>b</sup> Includes the occasional animal reported taken in May and June.

TABLE 9 Central Arctic caribou herd successful hunter transport methods, regulatory years 1992–1993 through 2004–2005<sup>a</sup>

Regulatory year	Transport methods (%)										Total
	Airplane	Horse/Dog	Boat <sup>b</sup>	3- or 4-Wheeler	Snowmachine	Other ORV		Highway vehicle		Unk	
1992–1993	89 (23)	7 (2)	17 (5)	6 (2)	0 (0)	0	(0)	243	(64)	18 (5)	380
1993–1994	49 (15)	4 (1)	20 (6)	4 (1)	2	0	(0)	242	(73)	12 (4)	333
1994–1995	81 (25)	0 (0)	23 (7)	0 (0)	0 (0)	0	(0)	214	(67)	0 (0)	318
1995–1996	87 (28)	4 (1)	30 (10)	0 (0)	0 (0)	0	(0)	177	(58)	7 (2)	305
1996–1997	63 (28)	8 (4)	19 (9)	0 (0)	0 (0)	0	(0)	126	(57)	5 (2)	221
1997–1998	58 (19)	7 (2)	14 (5)	0 (0)	0 (0)	1	(<1)	216	(70)	13 (4)	309
1998–1999	66 (21)	4 (1)	36 (11)	0 (0)	0 (0)	1	(<1)	205	(65)	3 (1)	315
1999–2000	100 (28)	9 (9)	29 (8)	1 (<1)	0 (0)	1	(<1)	218	(60)	6 (2)	362
2000–2001	90 (18)	17 (17)	74 (15)	1 (<1)	4 (<1)	0	(0)	302	(61)	5 (1)	493
2001–2002	108 (21)	7 (1)	68 (13)	1 (<1)	0 (0)	4	(<1)	324	(63)	3 (<1)	515
2002–2003	116 (27)	10 (2)	67 (16)	12 (3)	1 (<1)	2	(<1)	208	(50)	7 (2)	423
2003–2004	87 (21)	2 (<1)	97 (23)	3 (<1)	0 (0)	3	(<1)	222	(53)	5 (1)	419
2004–2005	101 (16)	6 (1)	172 (28)	0 (0)	1 (<1)	3	(<1)	326	(53)	4 (<1)	613

<sup>a</sup> Includes only harvest from harvest report cards.<sup>b</sup> Includes airboats.



The Federal Aid in Wildlife Restoration Program consists of funds from a 10% to 11% manufacturer's excise tax collected from the sales of handguns, sporting rifles, shotguns, ammunition and archery equipment. The Federal Aid program allots funds back to states through a formula based on each state's geographic area and number of paid hunting license holders. Alaska receives a maximum 5% of revenues collected each year. The Alaska Department of Fish and Game uses federal aid funds to help restore, conserve and manage wild birds and mammals to benefit the public. These funds are also used to educate hunters to develop the skills, knowledge and attitudes for responsible hunting.



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